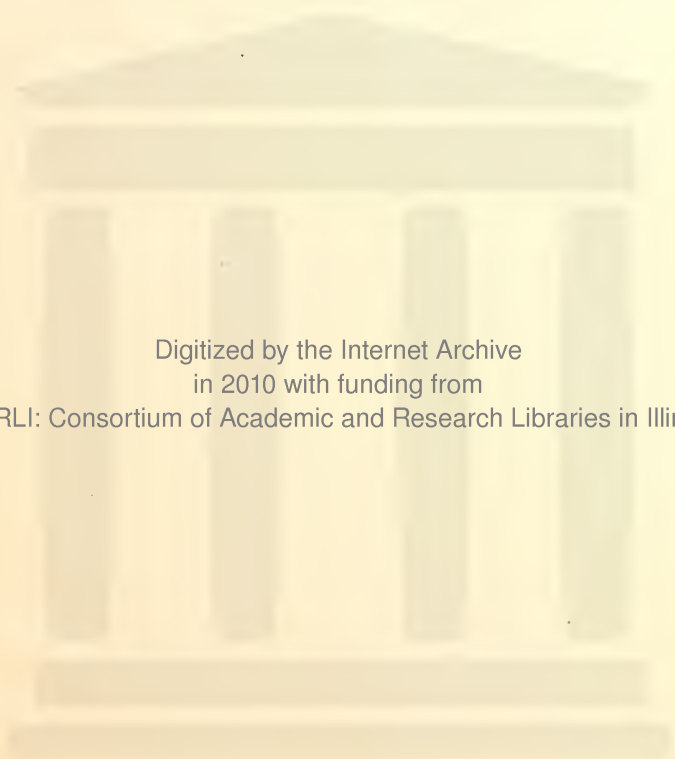




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The ARMOUR ENGINEER

VOL. XIX

NOVEMBER, 1927

NO. 1



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Mr. Hugh Ferriss has visioned many outstanding gigantic "buildings of the future." This reproduction is particularly appropriate at this time and special permission has been granted to use this illustration in college publications.

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THE ARMOUR ENGINEER

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ARMOUR INSTITUTE OF TECHNOLOGY

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In Memoriam

Armour Institute of Technology has lost two of its most loyal friends in the passing of Mrs. Philip D. Armour, Sr., and her son, Mr. J. Ogden Armour.

While Mrs. Armour's personal activities were principally concerned with the Armour Mission and the work of its Sunday School and Kindergarten, she always manifested a special interest in the Armour Institute of Technology founded by her husband, Mr. Philip D. Armour. Her fine and noble character has left an immeasurable influence on all those who were fortunate enough to be counted among her acquaintances and friends, and the memories of her kindly acts of charity and benevolence will be cherished by many organizations and individuals.

Mr. J. Ogden Armour was Chairman of the Board of Trustees of the Institute since the death of his father, Mr. Philip D. Armour, in 1901. Assuming and continuing the responsibilities of his father, he was the chief supporter of the Institute, supplying its needs generously and magnanimously. His greatest interest in the Institute was in the success of the students and uppermost in his mind was the necessity of training them to appreciate and understand that a sterling character is the greatest essential; without it educational training is futile, and with it, coupled with industry, a young man may aspire to an attainable ideal in life. Thousands of young men who have benefited by the opportunities offered through Mr. Armour will revere his memory and mourn his death as that of a real and personal friend.

We shall endeavor to carry on the work of the Institute in the spirit of the high ideals which he so splendidly exemplified.

H. M. Raymond.

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ARMOUR INSTITUTE OF TECHNOLOGY LOSES TWO LOYAL FRIENDS

THE summer of 1927 will long be remembered by those associated with the Institute, for it marks the passing of two of our most loyal and devoted friends. Mrs. P. D. Armour died at her home in Chicago on July 25. Three weeks later, her eldest son, J. Ogden Armour, died in England. Neither knew of the other's illness, the news in each case having been withheld because of their serious and weakened condition.

Mrs. Belle Ogden Armour, widow of Philip D. Armour, founder of Armour and Company, died at her home, 1200 Lake Shore Drive, Chicago, Monday, July 25. Mrs. Armour had been in failing health for several months and her death was the result of complications due to old age. She was 85 years old.

Mrs. Armour was born in Cincinnati, Ohio, in 1842, the daughter of the late Jonathan Ogden of that city. In 1862 she married Philip D. Armour, moving with him to Milwaukee, where Mr. Armour was at that time engaged in the packing and provision business. In 1875 she moved to Chicago with Mr. Armour, where the firm of Armour and Company was established.

Mrs. Armour was the mother of three sons, one of whom died in infancy, Philip D. II, father of Philip D. III and of Lester, now both vice presidents of Armour and Company, died in 1900. J. Ogden Armour, the oldest son and for twenty-three years president of Armour and Company and for four years chairman of the board of directors, died in London, England, August 16.



J. Ogden Armour.

Since the death of her husband, Mrs. Armour lived a retired life, devoting herself to her friends and her many charitable enterprises. Armour Institute and Armour Mission were her particular benevolences and she will long be remembered at the mission's kindergarten where she poured forth her love.

Much of the success of the great packing business of Armour and Company, founded by her husband, has been attributed to the able manner in which Mrs. Armour assisted him during the pioneer days of the business. As the business prospered, charitable and philanthropic enter-

prises benefited by the liberality of Mr. and Mrs. P. D. Armour, and after the death of the former in 1901, Mrs. Armour continued the good work. Her ability as a social leader and her wise counsel in affairs with which she had been connected caused a newspaper writer to refer to her as "a rare woman—rare in poise, grace, and mental balance."

At her bedside when she died was Mrs. P. A. Valentine, her daughter-in-law, and at the residence also were her two grandsons and their wives, Mr. and Mrs. Philip D. Armour III and Mr. and Mrs. Lester Armour. Mrs. Valentine's first husband was the late Philip D. Armour Jr. The funeral services were held at two o'clock Wednesday, July 27, from her late residence. The funeral services were conducted by the Rev. Johnstone Myers. Burial was in Graceland cemetery.

Jonathan Ogden Armour, son of the founder of Armour Institute of Technology and of the great packing firm of Armour and Company, died Tuesday, August 16, in London, England, after several weeks' illness of typhoid fever. As chairman of our board, Mr. Armour had continued and enlarged greatly upon his father's generosity to the Institute.

Mr. Armour was born November 11, 1863, in Cincinnati, the eldest son of Philip D. Armour and Malvina Belle Ogden. In 1881 he entered Yale but gave up his senior year to join the Armour packing house organization in 1883, in order that he might get an early grounding in the business. He was put into the firm, so to speak,

and learned it from the ground up. A year later he was made a partner and as his father's health declined his son assumed a larger and larger share in the direction of the business.

When in April, 1900, Armour and Company was incorporated for twenty million dollars, J. Ogden Armour became its first president. That same year his only brother, Philip D. Armour, Jr., died, followed in 1901 by his father's death. The sole management of the business then devolved upon J. Ogden Armour. Forthwith Mr. Armour began to build up the organization; to enlarge and expand the company and its scope. He cut loose from the entanglements of detail and announced as a policy, "Come to me with decisions, not for decisions."

When he assumed control, the company's business amounted to about one hundred and eighty-two million dollars yearly. In a little over two decades, under Mr. Armour's leadership, this was multiplied five times.

Mr. Armour's solution of that phase of the packing house market problem which related to securing raw materials was the establishment of packing plants in the most prominent and promising centers of production. The same policy was carried out in the establishment of branch houses for more adequate distribution of the finished product. Wherever in the world the demand from a consuming center was of sufficient strength to warrant the establishment of a branch house, there one was placed.

The evolution and development of refrigeration, a large part of which was carried on under Mr. Armour's direction, placed the European consuming market on a new basis. Mr. Armour was quick to take advantage of that marketing change and in order to supply that demand in the most efficient and economic way possible, established the plants of Armour and Company in South America and a number of distributing centers at strategic points throughout Europe.

During this period of building and expansion Mr. Armour followed, for the most part, the policy of his father of putting back into the business most of the profits earned. By 1916 the capital assets of the company had so increased that a 400 per cent stock dividend was declared, increasing the capitalization of Armour and Company to a hundred million dollars. Plants

had been established throughout the country, several during the war, and the distributing system of branch houses, car routes and agencies was literally world-wide.

Mr. Armour's business activities in addition to his connection with Armour and Company and Armour Institute were extensive; he was a director of several large financial institutions and railroads, among them being the Chicago, Milwaukee and St.

of business and commercial activity may be forgotten but his kindly friendliness will be remembered so long as those who knew him and worked with him are alive.

Others of his favorite sayings were: "Enthusiasm is the dynamics of your personality."

"Put your soul into your work and you will find it pleasanter every hour of the day."

"There is a premium in the big world on the man who can do things well."

Mr. Armour's friendliness extended to all those who worked with and for him. No employee was too lowly to be remembered. He made frequent regular trips throughout the Chicago plant, stopping here and there to chat with those he knew along the way, calling them by name—usually by first name—asking about their families, their friends, their ambitions; and not infrequently these men had grateful occasion to know that his remembrance of them was more than just casual, through substantial help freely but very unostentatiously given in time of need.

One of Mr. Armour's habits or hobbies was to present a suit of clothes or overcoat to one who had done something which pleased him and there are many who gratefully remember the time when they were literally "clothed in his beneficence."

Old employees were another hobby. On many and many an occasion they had reason to know that Mr. Armour regarded himself as more than an employer; that he was their friend and that so long as they served faithfully, no matter in how minor a capacity, they would be treated right, and even more than that, they would be remembered when their days of active service were over.

Mr. Armour, especially during the early part of his business career, followed in the footsteps of his father, the first P. D. Armour, founder of Armour and Company, who made a point of being the first person in his office in the morning and the last to leave at night—an existence that does not lend itself to social pursuits.

"I have no social ambitions," J. Ogden Armour once said. "My ambition is to run Armour and Company successfully and to give a great many young men a chance to make their way in the world. My associates in the business are my closest friends.



Mrs. Philip D. Armour, Sr.

Paul Railway, the National Bank of New York, and the Continental and Commercial Bank of Chicago. As Mr. Armour's business interests developed, so did his philanthropies—especially Armour Institute of Technology and its branches. His expenditures in this field far exceeded the very liberal provisions that were made by the founder. His other disbursements for the public good, though not widely known, were very large.

Mr. Armour was married in 1891 to Lolita Sheldon, daughter of Martin J. Sheldon of Suffield, Conn. They had one daughter, Lolita, now Mrs. John J. Mitchell, Jr. Mrs. Armour, Mrs. Mitchell and her husband were at Mr. Armour's bedside when he died.

"My associates in my work are my greatest friends," was one of Mr. Armour's favorite sayings and was typical of the man; it exemplifies his whole career. He was always a friend of all who worked for him. His achievements in building up the company as well as in many other lines

If it weren't for the fun there is in working with them and being with them I wouldn't stay in business."

Although he rarely accepted invitations to fashionable functions, he was always an affable host to his business associates and a few chosen friends, whether he received them in his fine old house on Michigan avenue—he and his brother, the late Philip D. Armour, Jr., built handsome residences there side by side—in the apartment at 3330 Sheridan road, which he and Mrs. Armour occupied later; at Melody farm, their beautiful country estate in Lake Forest, or at their summer camp on Long Lake, Michigan. But Mr. Armour avoided, rather than courted, the attentions of the many, and by the same token the few men and women to whom he looked for companionship treasured his friendship and today mourn his going.

No picture of Mr. Armour's life would be complete without the story of his unstinted patriotism. When this country entered the war in 1917 he issued this statement:

"The United States government can have Armour and Company. The government can have J. Ogden Armour. The government can have any man or group of men in Armour and Company." And he lived up to that statement. Too old for active service himself, he did everything in his power to help the country's cause during the war. His donations to the Red Cross were among the largest, if not actually the largest, made by any individual. He aided in every way possible all the liberty loan drives and he was a valued member of the Illinois Council of National Defense.

Though it did not occur while this war was actually in the World War, this incident will serve to typify Mr. Armour's patriotic service: In

1926 when the Illinois National Guard was ordered to duty on the Mexican border, the government did not have machine gun equipment and lacked money to furnish it. Rather than send the regiment ill equipped into service a group of public spirited citizens in Chicago started to raise a fund to furnish both machine guns and field kitchens. Mr. Armour contributed to this fund but when it became apparent

J. Ogden Armour, long the active head of our business and more recently chairman of the board of directors, is mourned by thousands of his friends, and particularly by those of us who have worked with him and lived with him as employees of Armour and Company. We have lost a real friend; one who was concerned if we were sick and equally thoughtful when we were well. Though he retired from active

participation in the management of this business nearly five years ago, he did not and could not lose our love and respect. Mr. Armour, son of the founder, fell heir to a big business. He developed it and expanded it to five times its size. He leaves an honorable name identified with many essential industries. Even more than that, he leaves the memory of his helpful, kindly and unostentatious friendliness in the hearts of all those who knew him and who worked with him. The world can ill afford to lose men like him."

Vice-President Charles G. Dawes: "The death of Mr. Armour is a great loss to Chicago and Illinois. As a business leader and as a man he inspired the respect and confidence of all who came in contact with him. He was a man of great generosity and to every

movement and enterprise for the good of Chicago he gave liberal aid. His benefactions for the poor were innumerable and never advertised. His city and his state are the better for his having lived and thousands will mourn the loss of this generous, modest and helpful man."

Edward F. Swift, vice-president of Swift & Company: "We are all deeply grieved to learn of Mr. Armour's death. Our acquaintance with him covers our entire business experience, in which we came to know him as a man of splendid character

(Continued on page 28)

Memorial Resolutions

Adopted by the Board of Trustees of Armour Institute of Technology and Armour Mission, October the Twelfth, Nineteen Hundred and Twenty-seven

WHEREAS, the Armour Mission and the Armour Institute of Technology have suffered a loss by the death of Mrs. P. D. Armour, who for many years was a member of the Board of Trustees of both institutions; and

WHEREAS, she was a loyal friend and supporter of these institutions from their inception and during the years of their growth and influence;

BE IT RESOLVED, that we, the Board of Trustees, in tribute to her memory, express here our sense of loss and to record in these minutes the cherished heritage of her ennobling influence and her concepts of mercy, kindness, and service to humanity.

BE IT FURTHER RESOLVED, that we extend our heartfelt sympathy to the bereaved family.

WHEREAS, the death of J. Ogden Armour has taken from the Board of Trustees of Armour Institute of Technology and Armour Mission its Chairman and wise counsellor; and

WHEREAS, he was the most generous supporter of these institutions and the warm friend and benefactor of the student body and thousands of alumni;

BE IT RESOLVED, that we, the Board of Trustees, record for those whom we represent the great loss which has been sustained and the great sorrow it brings;

BE IT FURTHER RESOLVED, that we offer to the bereaved family our deepest sympathy.

that its completion was going to be delayed, he at once unhesitatingly guaranteed the entire amount, making it possible to fit out the regiment, and not only were the machine guns secured but what are said to have been the first rolling kitchens, complete, with the mules for their transportation were bought for the regiment in time to be of use.

Many expressions of grief and tributes to Mr. Armour were received from notables throughout the country. Among these were the following:

F. Edson White, president of Armour and Company: "The death of

HEAT TRANSMISSION TESTS OF WALLS

By LESLIE E. DOWNS

Research Engineer, United States Gypsum Company

QUITE a bit of comment and curiosity has been aroused by the presence of sections of various types of building walls standing about the Mechanical Engineering Laboratory. In this article you will find satisfaction for that curiosity and a confirmation of your guess.—If your guess was correct.

WHEN estimating heating requirements for buildings, engineers and architects have need for the heat transmission coefficients of the type of construction used. Approximate values for a few of the more common types of wall and ceiling construction are known, but they must be calculated for many of the constructions less often used.

The formula used in calculating the heat transmission coefficient U of a simple wall of one homogenous material is:

$$U = \frac{1}{\frac{L}{K_1} + \frac{L}{K} + \frac{L}{K_2}}$$

where K_1 and K_2 are the conductivities of the surface film of air at the side where the heat enters the material, and leaves it, respectively, k is the conductivity of one inch of the material, and L is its thickness. K_1 and K_2 are often called the coefficients of admission and emission.

In calculating the heat transmission for a composite wall, a term of the form $\frac{L}{k}$ is included for each kind of material involved, and additional terms of the form $\frac{1}{K_1}$ and $\frac{1}{K_2}$ for additional surfaces in contact with air, in the case of hollow walls.

Buildings whose heating systems have been designed to meet the heat requirements, calculated in the above manner, often have been found very hard to heat, even though allowances had been made for exposure and air infiltration.

To test the accuracy of the calcu-

lated coefficients, as well as to obtain data on several wall and ceiling constructions obviously too complicated to calculate accurately, Prof. J. C. Peebles of the Mechanical Engineering Department assisted by the writer recently performed a series of tests.

The test samples used in this investigation were approximately 6 ft. 4 in. square, and in every other particular were full-size, being exact duplicates of the constructions found in actual practice.

The apparatus used is known as the guarded hot-box, and is discussed in the *Journal of the American Society of Heating and Ventilating Engineers*, Vol. 32, No. 5, May 1926. It consists essentially of a cubical box with internal dimensions of 3 ft. x 3 ft. x 3 ft. Five sides are made of heat insulating materials, the specimen to be tested constituting the sixth. Heat is supplied by means of electric heaters in this box, the construction of these heaters being such that a red heat is not attained, so that very little heat reaches the wall by radiation. The heater consists of nichrome heating coils on transite supports. This can be seen at *H*, Fig. 1, which shows the box with the wall specimen removed. The light bulb near the heater is used only to bring the box up to operating temperature, and is never left on during a test. The heat is allowed to

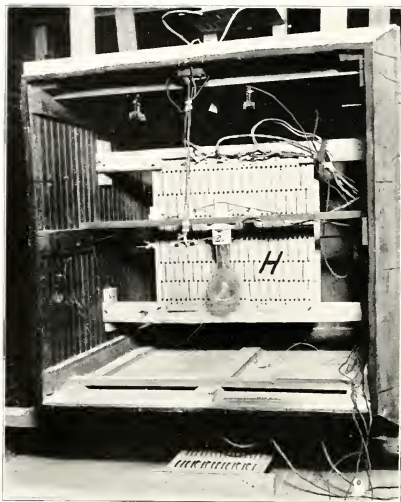


Fig. 1. The hot-box. A wall section is placed in front of the box, the temperature at both sides of the wall is held constant, and the energy input to the heater *H* is a measure of the heat transmitted.

flow through the wall under test, and is then dissipated into the air of the room. The electrical input is measured by the watt-hour meter *W*, Fig. 2.

To prevent heat loss through the five sides of the box, it is surrounded by another measuring 6 ft. x 6 ft. x 6 ft., also made of insulating materials, and clamped against the wall under test, which is a little over 6 ft. square. The relative position of the two boxes is such that the axis of the small one coincides with that of the larger. The air in the space between the two boxes is heated to the same temperature as that in the inner box, so that there will be no passage of heat from one to the other. The power required to produce this heat is not measured, inasmuch as it does not enter into the heat-flow calculations. The air between the two boxes is circulated slowly by a small fan, thus insuring practically equal temperatures on all sides of the inner box.

Copper-constantan thermocouples were used for temperature measure-

ments. Two such couples are placed one inch from the hot side of the wall, near the center, and two on the cold side, in a similar position. A thermocouple is placed one inch from each of the five sides of the inner box, and five more couples are placed *inside* the inner box, also one inch from the walls of the inner box. These last ten couples are for use in maintaining the temperature equality inside and outside the inner box walls. By means of a selector switch, any couple can be connected to a Leeds and Northrup Type K potentiometer, *P*, Fig. 2. It is capable of measuring potentials to the nearest microvolt, which corresponds to a temperature of about 0.04° F. The cold-junction is kept at a constant temperature of 32° F. in an ice-bath.

The inner box of the testing apparatus is braced firmly within the outer box, so that the whole apparatus can be handled as a unit, and turned into any desired position. This makes it possible to test walls in their natural vertical position, and ceilings in a horizontal position.

No test was started until all temperatures were constant, thus showing that equilibrium conditions existed in every part of the wall and apparatus. The *c. m. f.* of each of the 18 thermocouples was read and recorded every 15 minutes, and each test run lasted 8 hours. Two or more such runs were made, until two results agreeing within 5% or less were obtained, and the average of these two results reported.

Before the non-luminous or low-temperature type of heater was adopted, electric light bulbs were used. After the installation of the non-luminous heater, a few walls were re-tested. No consistent difference in results was obtained, some being higher than before, and some lower, but all were within the limits of possible experimental error. From this it was concluded that the heat transmission coefficient is not altered appreciably if a considerable portion of the heat reaching the wall is transmitted to it by radiation.

Inasmuch as no means for artificial cooling of the test room was available, it was necessary to settle in advance upon a room temperature which could, with reasonable certainty, be maintained throughout the entire

period of the investigation. A temperature of 90° F was accordingly settled upon, and a box temperature of 150° F, which gives a mean temperature of 120° F. Thus the temperature drop was 60° F, the same as that existing in practice when the room temperature is 70° F and the outdoor temperature is 10° F. A few wall specimens, however, were at first tested with a hot-side temperature of 185° F, thus providing data for an interesting

If the test temperature could be reduced to those prevailing in practice, there is no reason to believe that the coefficients of all walls would not be reduced in about the same proportion, so that if the walls were arranged in the order of their conductivities, this order would remain unchanged under the lower temperatures.

The heat transmission coefficients of the *hollow* walls tested were, in general, materially higher than those calculated by the formula

given in the second paragraph. For example, take ordinary frame construction, consisting of 2 in. x 4 in. studs, with lath and plaster on the inside, and $\frac{3}{4}$ in. wood sheathing, building paper, and drop siding on the outside. The Engineering Experiment Station of the University of Illinois gives a calculated coefficient of 0.22 B.t.u. per hour per sq. ft. per degree F temperature drop. The present tests showed the actual conductivity to be 0.33, the high coefficient found by actual test no doubt being due to rapid convection currents in the air between the studs. The methods of calculation in use do not take this into consideration.

It would seem that anything capable of retarding these convection currents would materially lower the heat transmission through the wall. The material used for this purpose was Thermofill, manufactured by the United States Gypsum Co. It is a gypsum

material, in the form of a light, fluffy powder. Thermofill provides a high insulative effect itself, as well as stopping the undesirable circulation of air within the wall. The magnitude of these effects is so great that the frame construction mentioned above, when filled with Thermofill, was found to have an insulation value *2.4 times* as great as when Thermofill was not used. Comparable results were obtained when Thermofill was tried in wall specimens of other types. It always increased the insulation efficiency of the wall from 2 to 3 times, thus proving the undesirability of allowing the air in the so-called dead-air spaces to circulate freely. Tests of a similar nature were made on several ceiling constructions. The results here were even more striking. The insulation efficiency of the ceiling was found to

(Continued on page 28)

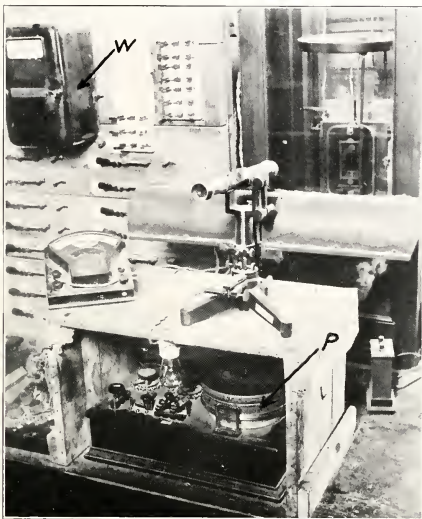


Fig. 2. The watt-hour meter *W* measures the electrical input to the heater. Temperatures are read to within 0.04° F by the use of thermocouples and potentiometer *P*.

comparison of results obtained at various temperatures. In the case of the higher temperature, it seems reasonable to assume that the heat transmission would be greater, because the mean temperature is increased. An increase in temperature causes an increase in the rapidity of convection in the air adjacent to the wall surfaces, and in the air spaces between the studs when such spaces are not filled with insulation. Another contributing factor is the increased transmission by radiation, which increases with the fourth power of the temperature range, on the absolute scale. This was borne out by the results on four wall-specimens which were tested at both the above temperatures. Upon changing from 185° F to 150° F, the heat transmission coefficient, *U*, decreased from 7 to 23 per cent, depending upon the construction of the wall.

DECISIONS AND THEIR RELATION TO SUCCESS

By GUSTAVE W. THOMPSON

Chief Chemist, National Lead Company

WHEN you go out into the world you will be a part of world and yet in a certain sense you will be independent of the world. You will have the power to make decisions—decisions affecting you and your character and affecting your relations with the world. The power to make decisions is a product of and is measured by your sense of freedom. I do not refer to the power to make decisions on abstract questions. I do refer to such questions as what you shall do, what your life shall be and how your life shall be conducted. I do not know how conscious each of you is of the insistency of these questions or how conscious each of you is of your power to decide what the answers shall be. I wish you would search yourselves and make sure that your power of decision has not escaped you.

This, I take it, despite all of the academic discussion there has been on the subject, is the most valuable possession that you have—the one thing that gives character to you. You should be conscious of this power, each of you, to a greater or less extent, and for practical purposes we need go no further than this consciousness. It is this consciousness which makes the poets say—"Stone walls do not a prison make, Nor iron bars a cage"—and stimulates us into the belief that we have a right to say—"I am the Captain of my Soul, The Master of my Fate." If we do not have something approaching this feeling, we may be sure that it is not the external things that are limiting us but rather that—"The heavy chains that hold us down are on the mind."

If you want to be free in this sense, you must watch over your freedom with a jealous regard. "Eternal vigilance is the price of liberty" said our forefathers, and eternal vigilance on your part is to be the price of your mental freedom. You must not allow any inferiority complex to get control of you. The very act of holding your head high—of throwing out your chest—will conduce to this consciousness of freedom. They used to say that "the man on horseback is twice a man." This is because he has a higher point of view. If you wish to be "twice a man" maintain your higher

point of view. Rise over the necessities of life—at least as far as you can—and press forward, as it were, to the prize of your high calling.

Our lives are made up of the rising and the fallings of spiritual tides. To each of us will come those times when we feel that our powers of decision are taken from us. Taking our lesson from the seaman, we should be patient and wait for the rising tide and then we should take it at its full. Do not think because you cannot conquer the world by the mere exercise of the will that this is something that should discourage you. You can conquer the world by a proper study of ways and means. All human progress in the material sense has been brought about by the mastery of the forces of nature which in themselves are full to overflowing with danger. A man conquers danger by the selection of suitable means for containing and controlling dangerous forces. He builds levees to control floods; he insulates the wires that carry electric currents of high intensity; he builds houses to keep out the elements; he drives piles and lays strong foundations to support heavy structures. The mastery of danger is an absorbing topic. The slogan—"Safety First" is unfortunately expressed. In most cases the safest thing to do is to run away from danger, in which case we would make no progress. What we should do is to face danger, measure it and adopt those means suitable for its mastery.

The power to make decisions is a magnificent power, but is not unfraught with danger. It tends to lead when unchecked to that "Vaulting ambition which o'erleaps itself and falls on the other side." The power to make decisions needs study for its wise use. Above all things you must realize that in building up your power to make decisions intelligence must come to its assistance.

The power to make decisions is increased by use and is also worn out by too continual use. In this respect it is like muscular activity. You use a muscle and its power of performance increases. Without periods of rest, however, the muscle becomes surcharged with decomposition products so as to lose its full power. I think I am correct in saying that the power

to make decisions is dependent upon the frequency with which it is exercised, but that this power is also to be conserved and not exercised on trivial matters and wasteful effort. Very often a decision becomes a precedent and then develops into a habit. Proper habits of thought, in effect, are invaluable in conservation of will power. Habits of thought develop into principles which we count our guides, relieving us of the necessity of excessive demands on the powers of decision.

Let me tell you an old fable, which may be familiar to you all and yet it is a fable of wonderful significance: Originally goats had neither horns nor beards. They wanted horns and they petitioned Zeus to give them horns. Zeus resisted them and wanted to know why they wanted horns. "Oh, horns are beautiful and horns are a great protection." But, says Zeus, "If I give you horns you will have to take what goes with them." And the goats replied, "We do not care what goes with them—give us horns." And so, finally Zeus gave them horns and beards. They were pleased with the horns but horrified with the beards. They petitioned Zeus again saying, "We did not ask for beards—why did you give them to us?" And Zeus replied, "I told you that if I gave you horns you would have to take what goes with them." And so, after much lamentation, the goats had to be satisfied to have the beards as well as horns, and the lesson was taught that we must take what goes with things.

In exercising your power of decision realize this. Nothing is unrelated except in degree, and when you make certain decisions always realize that with these decisions there are other things that follow with them. If we select a vocation, we work with that vocation and that vocation works upon us, modifying us. The potter cannot work with his clay without receiving unto himself some of its attributes. Man creates institutions and these institutions react upon man.

We are passing through a period of great prosperity, and we are apt to think of it as if nothing came with it of a less desirable character; but we also have a crime wave extending over

(Continued on page 14)

MODERN MERCURY-ARC POWER RECTIFIERS

From a Paper by OTHMAR K. MARTI*

Resident Engineer, American Brown Boveri Electric Corporation

ALTHOUGH alternating current has many great advantages, it is well known that there are numerous fields with great possibilities for the use of direct current, some of which are: trolley lines, subways, main line railroads, special drives and electrolysis. It is usually disadvantageous to produce the power required for these purposes by means of direct current generators, and, furthermore, it is often uneconomical to transmit direct current over a long distance. An efficient use of direct current is therefore possible only by distributing the power by means of high-voltage alternating current lines and converting it at or near the site of application into direct current. So far, this has been done for power purposes of the above-mentioned character by means of rotating converters of the following types:

Motor-generator sets, which consist of two separate machines, namely, a motor driving a direct current generator. The performance characteristics of such a set depend on the characteristics of the individual machines which constitute it, and the efficiency is the product of the efficiencies of the two machines.

Synchronous converters, or rotary converters, which are a combination of a synchronous machine and a direct current machine having a common armature and field structure.

Cascade converters, or motor converters, which are combinations of an induction motor with a synchronous converter, the second circuit of the former feeding directly into the armature of the latter.

Glass-bulb rectifiers, as well as the electrolytic, thermionic, and mechanical or vibrating rectifiers, are not built for large power outputs.

The most recent device for converting alternating into direct current is an outgrowth of the glass-bulb rectifier commercialized twenty-five years ago, the principle of which is well known. The present-day development of the

power rectifier, as it is usually called to distinguish it from the glass-bulb type, utilizes transformers with a larger number of phases and special connections, as well as metal tanks. The adoption of these made a number of things possible, such as efficient cooling of the tank by means of water

plished by fusing the wire into the bulb. Both of these difficulties have been overcome, which has made possible the growth of the metal-enclosed mercury-arc rectifier.

Installations on a commercial scale were begun in Europe in 1912, and then in capacities of less than 100 kw. output. About 1915, such perfection of detail had been effected that a general application of rectifiers began and has continued at an increasing rate each year, except for a short period due to the effect of the war. Up to the present there have already been installed more than 460 rectifier plants with more than 950 rectifier tanks of one make alone, of a total capacity of over 460,000 kw. The total output of all rectifiers installed by European manufacturers to date is approximately 600,000 kw.

A standard type rectifier with vacuum pump is shown in figure No. 1. This unit has a rated capacity of 1,500 kw. at 1,500 volts. Its overload capacity is 2,250 kw. for fifteen minutes, 3,000 kw. for five minutes and 4,500 kw. for one minute.

An installation which shows how easily rectifiers lend themselves to almost any location is a station of the *Chemin de fer Metropolitain* of Paris. The complete equipment is mounted on one of the platforms of a subway station, without any structural changes whatever having been made in the station.

Probably the two factors which appealed most to those responsible for the early acceptance of the rectifier were the high efficiency at all loads and the minimum of attendance required. Both of these factors are immediately reflected in the operating accounts, and in some instances in so pronounced a manner as to establish large credits towards amortization of the replacement investment where the rectifier was brought in to modernize a substation and supplant rotating machinery of early design. Especially is this so where machinery employed for conversion is operating under conditions which imposed a low annual load factor, as in the supply of direct

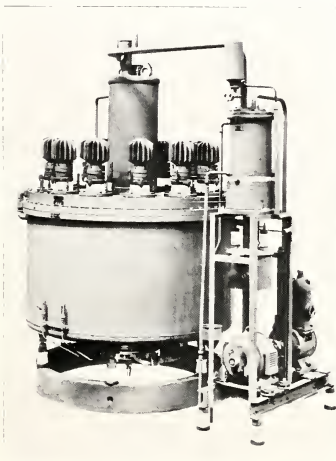


Fig. 1. One of the larger types of modern power rectifiers.

and the use of a greater number of anodes and therefore a larger power output. However, it also introduced difficulties which at that time seemed unsurmountable.

The difficulties in the commercial development of the rectifier for large capacity outputs were due to conditions arising from the necessity of using containers suitable for capacities in excess of those possible with glass containers. Among these difficulties may be mentioned uncontrolled mercury-vapour are phenomena, the obtaining and maintaining of an air-tight sealing of the anodes and the cathode in the container, as well as their insulation from it. In a glass-bulb rectifier the bulb itself is an insulating material, and sealing could easily be accom-

*This article is prepared from a paper by O. K. Marti, read before the Engineering Institute of Canada, Jan. 13, 1927, and printed in the *Engineering Journal*, May, 1927.

current power to rolling mill drives, elevators, dredge drives, mine, street railway and heavy electric traction haulage, etc.

The confidence which is placed in this device in Europe is probably best illustrated by the fact that the Berlin Rapid Transit recently placed one order for ninety-five rectifiers of a

the other without interruption of current in the load circuit, because enough energy is provided to maintain a voltage according to the law of induction to carry the arc over the zero period of the voltage wave. In the case of a three-phase connection with three anodes, it may be assumed that at any instant only that anode is active whose

potential with respect to the cathode is the highest, and much less pronounced undulations will be found in the direct current than with the two-anode connection. An arrangement with six, twelve or even twenty-four anodes will give an even better form of direct current.

With the small battery-charging rectifiers the arc is "struck" by tilting the container to establish a physical electrical connection between the cathode and an anode. Obviously, this could not be done with large power rectifiers because of size and weight. Other arrangements had therefore to be developed for this purpose. Figure No.

2 is a schematic diagram of connections, illustrating an arrangement for "striking" the arc and for maintaining it during periods of low current, which is connected to an auxiliary source of current supply and resembles the connections of a two-anode rectifier. The arc is "struck" as soon as the starting anode is withdrawn from the cathode, producing ionized mercury vapour in the container to establish an arc between the cathode and the maintaining anodes. This operation puts the plant into condition for immediately picking up the load.

The potential drop in the arc between the anodes and the cathode is about 20 volts. The losses due to starting and maintaining the auxiliary arc are negligible for tanks of larger capacity. A peculiarity of this arc is that the voltage drop remains practically constant for any current and any direct current voltage. This shows immediately the reason why such a type of rectifying device has a very high efficiency at higher voltages. Assuming a direct current potential of about 20 volts, the losses would be 50 per cent, or an efficiency of 50 per cent. For 200 volts,

the efficiency would be 90 per cent; for 2,000 volts, 99 per cent. For higher voltages the efficiency becomes practically 100 per cent. These percentages apply to the rectifier alone. It might be well to note here the fact that this efficiency drops very little at partial loads. Were it not for the increase of losses in transformers at overloads and at partial loads the overall efficiency of a rectifier would be practically constant at all load conditions.

Another outstanding advantage of the rectifier is the simple and quick process of starting, which is easily comprehensible by reference to the foregoing. In commercial practice the arc is "struck" and the rectifier brought to full capacity operation in a short space of time. It can readily be realized that from the time the operator closes the starting circuit,—whether by operating the main circuit breaker mechanically interlocked with the starting switch, or separately, or automatically,—until the rectifier can be connected to the line, only a second or two need elapse. Moreover, no mistake can be made by the operator because the actions are made to take place in the proper sequence.

There is one other thing which has to be considered in a modern rectifier, and that is the vacuum in the container. Thus far it has been noted only that the container has to be kept sealed. The reason for this is to maintain the degree of vacuum necessary for the proper functioning of the arc. It was an easy matter to design a vacuum

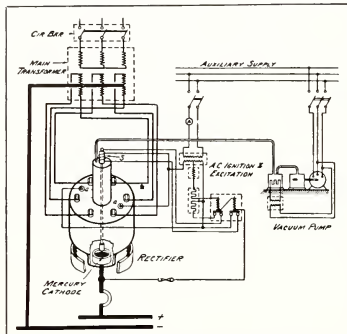


Fig. 2. Schematic diagram of connections, showing starting and maintaining equipment as well as the vacuum pump arrangement.

total capacity of more than 114,000 kw. continuous load and 228,000 kw. overload for the entire electrification of a belt line interconnecting all the suburbs of the city.

It has been known for more than forty years that if a source of alternating current is connected to two electrodes, one of which is mercury, and the space between the electrodes is evacuated, a valve action is obtained, so that if a sufficiently high potential is impressed upon these electrodes a unidirectional flow of current results from anode to mercury cathode. A single-phase rectifier has several well-known disadvantages; first, only half of each cycle of alternating current voltage can be utilized; second, there is no provision for maintaining the arc during periods of reversed voltage; third, the resulting direct current is very uneven. The effect of using poly-phase connections,—more than two anodes,—can be seen very clearly on the right side of figure No. 3. In the case of a two-anode connection, as shown on the left-hand side of figure No. 3, it can be seen that for this arrangement both halves of the wave are utilized. This means that the current will flow in the same direction through the secondary circuit with reference to the load resistance.

Due to the inherent inertia of reactance, which is a characteristic of very electric circuit, both anodes are active for a short fraction of a cycle, and the arc is transferred from one anode to

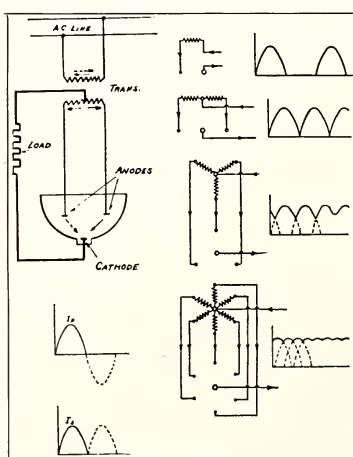


Fig. 3. Elementary diagram of rectification and forms of direct current obtained with various transformer connections.

pump for this purpose, and no difficulty has ever been experienced with this part of the apparatus. This pump is permanently connected to the tank of the rectifier by means of an air-tight pipe, as shown in figure No. 3. However, the part which required a great deal of work and development before it reached its present state of perfection was the continuous reading vacuum meter.

In order to maintain vacuum in the cylinders, several arrangements have been developed, the most successful of which is the employment of mercury. This arrangement has many advantages:—first, it seals perfectly; second, it can very easily be inspected should leakage develop; and, third, leakage, as soon as detected, can be eliminated by a mere tightening of screws. In all other arrangements so far developed, the main disadvantage has been the inability to maintain the joints tight for any reasonable time. Furthermore, in none of the other arrangements can leakage be detected; the vacuum may drop, and the attendant may be unable to determine the cause, while with the mercury arrangement inspection will immediately show the location of the fault. Moreover, should mercury leak through, no harm is done, as it will merely be added to the mercury in the cathode.

As pointed out, one of the factors which brought the rectifier to its present advanced state of perfection and which makes it competitive with rotary converters in size, voltage regulation and price, was the development of a poly-phase transformer with special connections, permitting the desired performance characteristic as well as greatly increased capacity.

The rectifier transformer differs from the standard power transformer, not only in respect to connections, but also in the provision for certain electrodynamic forces which made it necessary to provide different mechanical construction. The coils of these transformers are kept under a certain pressure by means of a specially designed support. Cast steel pressure rings at the top of the coils are pressed down by springs, thus forming a solid unit.

It is difficult to put mercury-arc rectifiers and rotary converters on a strictly comparative basis regarding load, space needed and price. Due to the fact that the rectifier has a very low

thermal capacity, its overload capacity is relatively small for longer periods, while on the other side the overload capacity is higher for momentary and relatively short periods. This is principally due to the absence of current-collecting parts.

As soon as the potential rises above 600 volts there is a very great advantage in favor of the rectifier. Although the efficiency of a 600-volt rectifier set at full load is about the same as for a rotary converter set at

be necessary to install a conversion unit in the basement of the building, satisfactory ventilation for converter installations is usually obtained only by resorting to elaborate and extensive alterations, involving air ducts, fans, filtering systems, etc.

As mentioned above, the rectifier losses are dissipated by water cooling, and therefore the removal of the heat outside the rectifier room is a relatively easy matter. The problem is about the same as with a water-cooled trans-

former. The simplest cooling scheme is to use tap water, or, if that is not available, or too expensive, a well or spring could be utilized. There are also closed-cooling methods, in which water is recirculated.

In regard to floor space requirements, it might be said that a 600-volt rectifier installation requires about the same space as a comparable synchronous converter installation. For high voltages the rectifier installation requires less space. However, it must be kept in mind that due to the light weight of the equipment, and due to the absence of rotating parts, practically no foundations or other special building construction is necessary. Furthermore, the various parts of the equipment belonging to a rectifier installation can be distributed and placed in more advantageous locations than with rotary

converter installations, permitting a fuller utilization of the available space. This fact is very well illustrated by figure No. 4, which shows the transformers located in the basement and the rectifiers on the floor above, with some of the auxiliary apparatus, as vacuum pump, etc., allowing a good utilization of the space by distributing the equipment on different floors of a building. In figure No. 4 it can be seen that for a rectifier installation far less unoccupied space is necessary, particularly in the height of the room in which the rectifiers are housed. This might be a material advantage in congested districts where special attention would have to be given to the layout.

One example of the above mentioned fact is that of an elevated railroad passing through the heart of a large city, where it was necessary to place the converting units at the points of highest traffic peak loads in order to eliminate the feeder cables and secure the highest economy of operation. This

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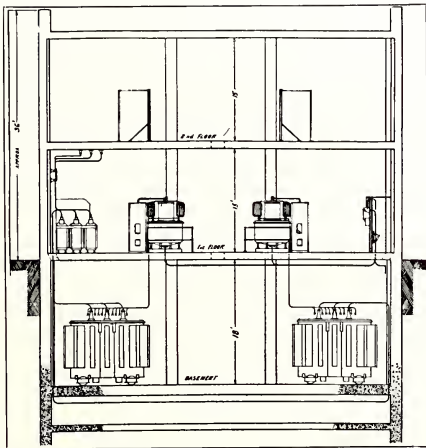


Fig. 4. A typical rectifier substation layout, showing the efficient use of space made possible by the light weight of the equipment.

full load, the difference in the efficiencies of these two types of equipment becomes very noticeable at partial loads. The difference in the converting losses for these two types of equipment is represented by the shaded area at the bottom of the figure for a load distribution as given in the middle section.

The cost of operation and maintenance of a rectifier are somewhat less than for other types of conversion apparatus. Moreover, the scheme of control is very much simpler than with any of the well-known methods for starting converters. From the outline of the starting procedure of a rectifier and considering the above, it will be appreciated that the adaptability of the rectifier to automatic control is generally greater than that of the synchronous converter. Another advantage is the fact that practically no noise is produced, except the occasional cut-in of relays and breakers and of the pump, which is negligible, since there is very little rotating mass.

In congested districts, where it may

DECISIONS

(Continued from page 10)

the whole country and a disrespect of law that is phenomenal. Our prosperity and our crime seem to come together. What their relation is we can only guess, just as we can only guess what the relation is between horns and beads.

We have passed through a period of excessive demand for penal legislation—legislation in many cases unsupported by anything approaching universal sentiment. The demand for this legislation has been largely from those who have not perceived that all things are related and interdependent and that such laws cause a general weakening of character.

Reformers, generally, think of their specific reforms as complete and satisfactory in and of themselves, and they are unwilling to note that reforms are not self-enforcing and often carry with them requirements and penalties for which provision is not made.

Youth has its advantages and its disadvantages. It has wonderful recuperative powers but is weak in its immunities from disease. On the other hand, age loses its recuperative powers but is strong in these immunities.

This is an age of organization and highly developed processes, but highly developed processes do not take care of themselves. They require constant and careful supervision, watching all the indicators and points of control to see that the organization or process operates properly.

Each of you is approaching important decisions. If you will be wise you will try to find out what goes with these decisions. Look beyond the immediate thing that you are inclined to decide in favor of and see, if you can, what it entails. If you are to go into business for yourself, you must know all the ramifications and needs of that business. If you are to enter employment with a large corporation, you must realize that you only become a part of the organization and must patiently await the opportunity to rise, step by step, in the organization. Do not think, however, that what I say should discourage you, for even the evils we have to suffer are accompanied by things that go with them that to a great extent compensate for them. Do not decide, therefore, that the evils that you suffer and the pleasures that you enjoy are unmixed. Each has accompanying compensations.

While the sanction for your decisions rests entirely with each of you, the burden of enforcing them can be greatly relieved by getting the advice of others, particularly those who are

competent to advise. The man who attempts to decide everything for himself will find himself jumping from decision to decision which will result in his being more or less continually in a tangle. There are certain social conventions which to a limited extent we have to observe unless we wish to pile up for ourselves the responsibility of enforcing our own decisions regarding them. Whether these conventions are all that could be desired or not, for practical consideration their observation becomes mandatory; that is to say, if we want to avoid being more or less continually in hot water and more or less continually diverted from the main purpose of our lives, we must observe these conventions. I would not for a moment advise any of you to sacrifice what I have called your sense of freedom, but you must bear in mind that the sense of freedom develops to the highest degree in the leading of an orderly and more or less systematic life. Furthermore, if you are planning out a certain scheme of living which has more or less a definite objective, the accomplishment of these things cannot be attained if you are continually diverted from their attainment by putting yourself in conflict with conventions which are more or less trivial, after all, as compared to the main purpose of your life.

I am not disposed to criticize those who are constitutionally opposed to our social conventions. Their life is a hard one which, perhaps, has some compensations. They are pioneers in thought and suffer all the hardships of pioneers. They represent those spontaneous or accidental variations from type from which, according to the theory of evolution, we may expect advanced varieties to spring. Perhaps each one of us is a conformist and a non-conformist in varying degrees. I cannot tell you how far to go in either direction. Perhaps no one can tell you. Perhaps this is determined by your constitutional makeup. I can, however, suggest this: To the extent that you are a non-conformist you will find it best for yourself and best for the world that you be a non-conformist to only a limited degree. This I think rests within your power of decision. If you do not follow this plan you will be like the boy Barrie tells about who ran hither and thither seeking to be a witness of events, which in each case happened before he arrived there, and in the end he could only sit down and sneer at himself.

This is a day of specialization. Even those with most highly developed intellects find themselves limited in the number of subjects regarding which

they can have any comprehensive knowledge. This is true in science, in technical pursuits and in business. In the engineering professions we find that each of them is developing special branches. While a broad education is desirable just as breadth of mind is desirable, as we begin to apply our knowledge we find that we must know our special subject almost to the exclusion of an intimate knowledge of other subjects. The man who has selected early in life a branch of activity finds that in his special field it is easy for him to arrive at decisions, but just to the extent that this is easy it becomes difficult for him to arrive at decisions outside of that field. We are finding it, therefore, every day more essential that we should be willing to take advice in arriving at our decisions in fields in which we are not expert. If, therefore, you would preserve your power of making decisions you must be willing to go to others for assistance and advice—whether that assistance be sought from a religious teacher, a physician, a lawyer, or an expert of any branch of activity.

Our power to make decisions is very often affected by our willingness to accept the results of those decisions. If we make a wrong decision and refuse to accept its consequences we do so at the sacrifice of manhood. I think you will agree with me that the type of man that you like is one who is a real sport, one who accepts the judgment of a final court or umpire without kicking and without a grouch. A real sport has to accept many things in this life, even if he has had no part in determining these things. We make mistakes, we commit errors, sometimes by pure accident or forgetfulness. If you want to retain your power of decision, get these out of your system as soon as you can. Take your punishments if they are coming to you with a stiff upper lip and with a firm resolve that they shall not act as handicaps upon your mind. We do not always walk upon firm ground. Sometimes we slip and become besmirched with mire. Under these circumstances the measure of manhood is our willingness to acknowledge our errors without attempting to excuse them or varnish them over. This is what I mean by getting them out of our system. We purge ourselves of them.

I wish I could force this thought upon you and convey to you a conviction which has grown steadily stronger in my mind each year through a long life. Willingness to admit when we are in the wrong—whether the matter be small or big—is the most important thing that you can develop if you

(Continued on page 30)

THE BOY SURVEYORS IN WISCONSIN

By A. B. STEVENS, '30

Student in the Civil Engineering Department



The author

CAMP was quiet. Nobody was drowned, nobody sat on a porcupine, nobody was hugged by a grizzly, and while there were plenty of Indians around, they were of a peaceful disposition. The campers learned lots of new cuss words and a few very old songs; and they learned by practical observation of the C. M. & St. P. the approved method of laying railway curves with straight rails.

Distances were measured by tape, angles were measured by transit, elevations were measured by level and rod. And after this preliminary monkeying with a lot of expensive equipment, the faculty took the instruments out and put them back into shape. Topographic maps were made of hot and desolate valleys while ambitious young engineers leaned on the plane table with devastating effects on the adjacent landscape. Great care was used in all this work, that no mistakes might be made. Care, in fact, was constantly foremost in the minds of all the workers. "Accuracy", remarks a young surveyor, lying under the shade of an aspen, "Accuracy that's what we want. Not speed, accuracy. If you go too fast, you may make mistakes. If the prof comes into sight, let me know." In spite of the painstaking care indulged in, a figure, camouflaged against the landscape by a khaki outfit, was frequently discovered sitting silently on a stump not very far away. Such errors in judgment were quickly rectified without the use of an eraser.

Several railways were laid out during the last week, called variously the *L. E. & H.*, (*Leave Early and Walk*), the *Bagdad*, *Liverpool & Englewood*, and the *Trout Lake & Pacific*. None of these titles were considered very funny

by anyone except the man who originated them, but in each case this one individual got a hearty laugh.

The campers got lots of exercise, especially those who went out with the Evinrude. The Evinrude made splendid ballast for one of the heavy boats, and while one or more members of the crew cranked it, the others would row about the lake; in this way everybody developed exceptionally strong arm

souvenir store and forgot the Indians, devoting most

of their efforts to making a record-breaking trip back to camp. The wild night life of the Chippewa Indians was no less than shocking to the campers who had seen Indians in the movies, for on the word of one who was kept awake, they drive their Fords and yell until three A. M.

The social activities of the camp were many and varied. The big horse shoe contest was a tremendous success, although at this late date no one could be found who remembered the results. The indoor baseball games were called off only because the score keeper couldn't read his slide rule to more than four places.

Runs were made on an average of about fifteen a minute.

The dance hall at Trout Lake entertained numerous engineers each week, in fact one night the party would have broken up had it not

been for Edstrand, Kloeppfer, Fensterle and Weitzul. The orchestra failed to show up, and this incomparable quartette played all the latest hits on two frying pans and a washboiler. They had a typewriter when they started the grind, but it gave out before the end of the third round and nobody seemed to know how to tune it again.

Like all big red blooded he-men, the campers just simply adored animals. In fact a few of the pets were pampered so much by indulgent grubstaking that they fell quite ill. Take the case of Oscar and Susie, two chipmunks who lived below and in the tent occupied by Fischman, Chamison and Chun. Chamison fed Oscar and Susie a whole box of raisins unwittingly one evening when he was in Trout Lake. Feeling strongly that all was not well within, Oscar and Susie wandered over next door, where they discovered a box of pills pertaining to digestion, and, there being no question in the minds of the chipmunks that their digestions

(Continued on page 30)



The surveyors at work.

muscles. Once the Evinrude started to go, but the casualties were not serious.

The Fourth of July vacation came at a convenient time, splitting the work into equal periods of time. During these three days, Wisconsin was thoroughly explored. Gibson, West, Hurley and Blomme got a couple of canoes for the occasion and, having wandered all over three counties, returned with yarns of the great open spaces and mosquitoes that would make Paul Bunyan look like Gelett Burgess. Nobody believed these tales, but it turned out later that most of them were true. The Indian reservation was voted a flop. The Indians drove Fords and sang jazz songs. Apparently nobody's life was threatened while at Lac du Flambeau. Fischman and Chamison discovered a dance hall and a



Professor Wells.

THE ARMOUR ALUMNUS

J. WARREN McCaffrey, '22, Editor

J. SHEPPARD SMALLEY, '07, FALLS TO DEATH

In a trial trip of a motor rail-car of his own design, J. Sheppard Smalley, '07, fell from the door of the car as it was crossing a 40-ft. trestle on the railroad between Tawanda, Pa., and Buffalo, on August 11 and was killed instantly. The car was built at the Davenport Locomotive Works, in Davenport, Iowa, and last June Mr. Smalley, accompanied by C. H. Vandervoort of Moline, Ill., and an operating crew, started east to demonstrate it for the Susquehanna & New York Railroad.

Mr. Smalley was born at Muscatine, Iowa, in 1885 and was graduated from Armour Institute of Technology in 1907, with the degree of bachelor of science in electrical engineering. From 1909 to 1915 he conducted the Smalley Auto Co. and the firm of Smalley & Halling, at Muscatine, as owner of the former and a partner in the latter. From 1915 to the time of his death he specialized in gasoline rail-car designing and building, successively with the Chicago, Milwaukee & St. Paul, the M., B. & S., and the Arizona & New Mexico Railroads; the A. Meister Sons Co., of Sacramento, Cal.; and the Smalley Rail-Car Co., of Davenport, Iowa.

DEATH OF WALTER E. MILLER, '01, CAUSES SHOCK

Friends of Walter E. Miller, '01, were shocked to hear of his sudden death. An article in the National Underwriter says:

"A shock ran through the great Insurance Exchange building, Chicago, last Saturday (October 15) when it was learned that Walter E. Miller had fallen to his death from the window of his private office on the twelfth floor of that building. Mr. Miller was a member of Fred S. James & Co., western managers of the General of Paris, Urbaine and Eagle Star.

"Robert E. Adamson, Cook county manager, had been talking with Mr. Miller in the private office a moment before the tragedy occurred. Very shortly after Mr. Adamson entered the office Mr. Miller remarked that he felt ill and weak, and needed some fresh air. He walked to the window, opened it and leaned out. In a minute or two he closed it and returned to his desk. However, he quickly again remarked that he was not feeling right and started for the window. Mr. Adamson started to leave, and on glancing back saw the form of Mr. Miller disappearing over the window sill.

"Hundreds on Sherman Street, just alongside the Insurance Exchange, saw the fall. Death was instantaneous. The body landed near the curb between two automobiles.

"Mr. Miller was one of the cleanest and ablest insurance men who have gone to the top in recent years. His training was thorough. He graduated from Armour Institute.

"Mr. Miller was 48 years old. He was born at Chicago Heights, Ill., and at the time of his death lived at 4837 Kimbark Avenue, Chicago. He is survived by a widow and two sons, Louis Reed Miller and Robert Abner Miller. Harold A. Miller, assistant western manager of the North American, is a brother."

ANOTHER SUCCESS FOR W. R. WILSON, '06

Early this summer all of the district sales managers of the Copeland Electrical Refrigeration Company were called together for a conference at the Hotel Statler in Detroit, Michigan, to hear the story of the remarkable rise of their company. Sales for the first half of this year were so large as to establish a sales record for a corre-



W. R. Wilson.

sponding period in previous years three times the gross sales for the same period last year.

The story of the rise of the Copeland Company was told by C. W. Hadden of the executive staff. He attributed the wonderful showing for the first half of this year to the organization genius of the company's president, William Robert Wilson. When Mr. Wilson became associated with the company the thing complained of as the company's burden, was too much overhead. Strangely enough Mr. Wilson found the cure for too much overhead in more overhead. Herein we see the genius of the company's president. He surrounded himself with a sufficient number of high-powered executives whose efficiency and ability aided by Mr. Wilson's direction enabled the Copeland Company to overcome its previous sales resistance and achieved this year's remarkable success. This movement he set on foot is typical of the industrial revolution of the present day, not only in Detroit but throughout the world.

Mr. Wilson is also president of the Guardian Trust Company, in Detroit, and is at present the chief executive of the Murray Body Corporation of America, also of Detroit.

NEWS OF THE ARMOUR ALUMNI

Jeff Corydon, Jr., '22, who was the young vice-president of our Alumni Association in '26-'27, now signs his signature over the title sales manager. He has forsaken Chicago, taking employment and residence in Harvey, Illinois, one of Chicago's up and coming suburbs on electric transportation line. As Jeff writes, it is thirty-eight minutes from Randolph Street, Chicago. He is sales manager of the Joseph Harrington Company, a subsidiary of the Whiting Corporation. They are manufacturers of the King Coal automatic stoker for heating and small power plant boilers.

Had dinner the other evening with H. W. Munday, '23, and enjoyed a very pleasant visit with him. Harold, as you know, is still wrapped up heart and soul in his work as editor of *Pit and Quarry*.

Received an announcement recently that Max Lowell Cable, '16, and Alexander H. Spitz, '16, have combined their architectural practices and will do business henceforth as Cable & Spitz, Architects. Their offices are at 1700 Consumers Building, 220 So. State St., Phone Harrison 7400.

Another announcement came in dated September 16, stating that Harlan R. Harwood, '24, has permanently lined himself up in the insurance field with Bennett Griffin, Ingram & Company. Their offices are at 14 E. Jackson Blvd., Telephone Wabash 1371. Give Harlan a ring.

Si Streeter, '27, is designing big buildings for Sloan & Johnson, Architects, at 161 E. Erie St. Inasmuch as Sloan & Johnson are destined to become a pair of our city's leading architects, we think Si made a very good connection.

Had a very pleasant and real surprise last month when I ran into Wm. C. Zingheim, '21. If you didn't know Bill, you have at least heard of him as the Babe Ruth of Armour's baseball teams. After he got tired running around the bases on Ogden Field he went to Lafayette, Indiana, and tried out the baseball diamond of Purdue University. Besides earning his athletic emblem and a degree from Purdue University, he played in that greater game and won a Purdue alumna. Mr. and Mrs. Zingheim are living at 6723 Paxton Ave. Bill is a sales engineer with C. A. Dunham Company.

On June 1st of this year Henry Rosenthal, '10, became associated with Chase & Waring for the general practice of engineering, under that firm name. They are located at 420 Lexington Ave., New York City.

There are rumors afloat that Herb Witte, '25, is going to lose his happy home, because his parents are going to move out of the city. Herb has formed a partnership with Marsh Polk's, '27, brother in a small apartment on the north side.

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ARMOUR INSTITUTE OF TECHNOLOGY

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Our Slogan: Make The Armour Engineer the best technical college publication in the country

*Happiness and usefulness—not wealth—
are the true measures of success and
they are within the reach of every man.*

—J. OGDEN ARMOUR.

UPON the opening of school each fall, we find that about one hundred fifty familiar faces have disappeared and that about two hundred fifty new ones have appeared.

After a period of two weeks or so, bewildered expressions and hesitant manners seem to melt away, quiet neckties are replaced with red ones, hats go into the discard, and trousers become more voluminous. The freshmen are donning the collegiate uniform.

Uniformity in manners and dress are harmless enough—if the imitation stops there. The freshman, however, finds a close similarity in the class schedules and in the teaching methods. He sees doses of knowledge carefully prepared and poured into him, much as a chemist measures and combines ingredients for a standard solution.

Engineering studies offer the student little opportunity to develop his individual abilities. The knowledge gained in his classes is of fundamental importance and is indispensable if he wishes to qualify as an engineer. The qualities which will make him an individual instead of a standard type must, therefore, be cultivated outside of

class. These extra-curricula activities may take any of a variety of forms. Athletics, perhaps, is the most popular. Engineering societies, musical organizations, and fraternities offer splendid opportunities to learn men. The library is full of ideas. Work on the student publications is about the most broadening of all the activities. Any number of opportunities are open to the student who is awake.

We absorb the characteristics of our associations. An engineer who lives for nothing but his machinery becomes a machine himself. Studies are of primary importance and should be mastered—but don't stop there. "With all your getting, get understanding."

AN ARMOUR student, talking to the chief engineer of one of Chicago's manufacturing concerns, remarked that he had seen equipment manufactured by this company being tested at a laboratory which he had recently visited. The engineer asked the student the names of the men he had met at the laboratory. Although he had been introduced to several men, the student could remember only one name and was

compelled to admit having a poor memory.

The professional man, thereupon, proceeded to give the student some free advice on professional associations. Engineering practices, he pointed out, are completely covered by good text-books and any industrious fellow with average ability can absorb the bare facts of engineering without spending four years in school. One of the special opportunities offered to the man in college is the privilege of meeting prominent men in the field. When the student does not make the most of this opportunity, he is neglecting one of the most important parts of his technical education.

It is true that friendship is to be valued for what there is in it, not for what can be gotten out of it, and this thought may be offered as a counter argument. Professional acquaintances, however, are not cultivated primarily for the sake of friendship but for possible utility. Still, it is not at all impossible for real friendships to develop from these contacts.

When an engineering problem presents itself, there is almost always some one who has had previous experience with a similar problem: here the engineer with a broad acquaintance has a decided advantage. This cooperative interchange of ideas makes for increased efficiency.

While the student left the recording of meetings to his memory, the engineer carried a small notebook in which he entered the name, date, place, and any other pertinent facts, for each new acquaintance he made—a small investment paying large dividends.

MOST people, especially those who are well educated, frequently boast of their open-mindedness. But, if you think that people as a rule are open-minded, just go out and try to introduce a new idea. You'll find that you have a big job on your hands; much bigger than you think.

Today when people complain because there is but one bathroom in some houses, and all the magazines are filled with advertisements of bathroom fixtures, we forget that bathtubs did not always exist and were not always popular.

Cincinnati startled the country by putting the first bathtub into use in 1842. Physicians criticised it. Newspapers printed editorials for and against it.

Medical men said the shock of taking regular baths would be dangerous. The Virginia legislature tried to stop the spread of the devilish idea by sticking a thirty dollar tax on each tub. Boston prohibited baths except upon medical advice. Down in Philadelphia there were a sufficient number of ultra-progressives to defeat by two votes an ordinance that would have made baths illegal between November and March.

We laugh now, at the people who took that stand against the innocent bathtub. But are we so sure that the people of the not far distant future will not laugh at us for refusing to accept ideas urged upon us by the so-called ultra-progressives of today?

It wouldn't be so bad if we refused ideas after listening with open minds to arguments for and against them. But so many of us don't do things that way. We issue snap judgments. "That idea is no good!" we say. When asked why, we answer, "Because if it was any good, smart men would have used it long ago."

Here is where the pioneer comes in. The business man who, with open mind, appreciates and accepts a new idea is just as much a pioneer as the creator of that new idea. It is such men who are responsible for our industrial progress.

Adapted from NET RESULTS.

SOCIETIES

Where the Novices Meet the Experienced of the World

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The officers of the Armour branch of the American Institute of Electrical Engineers for the current year are:

President.....L. J. ANDERSON
Secretary.....H. T. DAHLGREN
Treasurer.....W. J. ZENNER

The first meeting of the year was held on Friday, October 7. (Meetings throughout the remainder of the year will be held on the first and third Friday of each month.) At the first meeting, L. J. Anderson informed us of the arrangements which are being made in regard to the coming A. I. E. E. convention of the Great Lakes district. This convention is to be held in Chicago, November 28-30. November 28 has been set as Student Day at the convention. It is hoped that there will be an excellent turnout of electricals.

In the very near future Mr. Durgin of the Commonwealth Edison Company will speak before the members of the A. I. E. E. It will be remembered that Mr. Durgin gave a very interesting lecture in the assembly hall last semester.

We are proud to announce that the junior electricals were one hundred per cent loyal in enrollment in A. I. E. E.

The first A. I. E. E. smoker of the year was held at the Theta Xi house on November 9, Glenn Vandavey serving as chairman of the committee. The entertainment was excellent, the fellowship jovial, and the food plentiful.

WESTERN SOCIETY OF ENGINEERS

The Armour branch of the W. S. E. held its first meeting of the year on October 7, and had for its speaker Col. Boydan, who spoke on *The Workability of Concrete*. The good attendance of the civil students at this meeting is taken as a sign of a banner year. The officers are making every effort to secure engineers of prominence as speakers.

An invitation is extended to all freshman civils to attend the W. S. E. meetings.

The officers for the ensuing year are:
President.....FRED NATELLA
Vice-president.....L. R. OLSON
Treasurer.....J. B. SADLER
Recording Secretary.....G. A. AMUNDSEN
Corresponding Secretary.....BRUNO RYBICKI

FIRE PROTECTION ENGINEERING SOCIETY

The Fire Protection Engineering Society was formed shortly after the course after which it is named was founded at Armour Institute of Technology.

The officers for the ensuing year, having been elected in the last meeting held last year, are as follows:

President.....K. H. PARKER
Vice-president.....O. R. BESCH
Secretary.....W. D. ALLEN
Treasurer.....H. O. SNODGRER

The primary object of the Society is to create good fellowship and interest among

the students who are taking the course and to become better acquainted with the men now in the field. These men speak at our regular meetings, bringing to us knowledge of the various branches of the insurance business. At our first meeting, we had the pleasure of hearing Mr. Ernest Palmer, manager of the Chicago Board of Fire Underwriters, who explained the inner workings of the Chicago Board.

Membership in the Society is open to any student in the fire protection engineering course. We especially urge the freshmen to take advantage of this opportunity to become acquainted with the men in their own course.

The dues are one dollar a year, which is used to defray the expenses of our smokers. Each member receives the shingle of the Society.

Our meetings are held on the first and third Fridays at 10:30 A. M. in the Physics Lecture Room. The speakers will be announced through notices on the bulletin board.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The Armour branch of the American Society of Mechanical Engineers started the year with the following men as officers:

President.....E. B. KAPKE
Vice-president.....L. E. JOHNSON
Secretary.....O. W. SANDORF
Treasurer.....R. J. GEITMANN

With these men in office, the Society feels sure of a successful year.

The first meeting was held on October 7, at which we again had the privilege of listening to our own Professor Peebles, who gave us a very interesting insight into the advantages of the A. S. M. E. He also discussed the presentation of engineering topics.

On October 21, an informal talk was given by Willis Thomas. His topic might well have been named *The Kinematics of Excavating Machinery*. Mr. Thomas discussed the mechanisms of the gasoline engine shovel, drag line, and trench digger. During the summer Mr. Thomas was actively connected with the sales staff of the Pawling & Harnishphager Co. in Milwaukee and as a result had his material well in hand. The talk was appreciated by all.

The A. S. M. E. has made plans for a series of illustrated lectures on some very interesting engineering subjects and wishes to encourage a good attendance at each one. These lectures are to be given during the course of the year and the Society invites all those who are interested to attend.

The membership of the Society is open to all juniors and seniors in the mechanical engineering department and it is the desire of the Society to have all such men on the membership roll, and their support at the meetings. We also wish to extend an invitation to the freshmen and sophomores to attend the meetings. Come to the meetings and hear what the leaders in the game have to say.

Watch the bulletin board for announcements.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Beta chapter started this year with a business meeting in Room A on October 21. The results are indicative of the fine work which this group is going to do. The officers are:

President.....F. O. JOHNSON
Vice-president.....J. H. ATWOOD
Treasurer.....U. G. NAEF
Secretary.....J. R. YOUNG
Social Chairman.....G. C. DUFOR

A. I. Ch. E. is all that the name implies—namely, an association which fosters the ideas and purposes of chemistry. The latest theories and processes are usually discussed in some form or other by engineers and men prominent in their fields. As a result, the group gets the latest information on chemistry in such a way that we are always interested. Besides, we meet real "chemicals."

In addition, we have the opportunity of hearing our own faculty talk on subjects which are nearer and dearer to them than their regular prescribed lectures. Some of the problems which arise in actual practice are extremely complicated and offer sources of genuine research. Apparently, a chemist's life is not all roses.

From the student point of view, the Chemical Society gives the group a chance to meet fellow classmen. It is always a pleasure to talk to others in the same line of study, and to get their viewpoints.

All chemical students and others interested are invited to attend our meetings. The freshmen and sophomores, especially, are urged to come because the sooner they become acquainted, the sooner they begin to get the most out of the Society.

ARMOUR TECH MUSICAL CLUBS

The Armour Tech Musical Clubs is an organization made up of members of the band, orchestra, Glee Club, and the more recent novelty, the Stress and Strains. The sole purpose is to engage the minds of the students with other matters than nuts, bolts, screws, and gears. The members hold rehearsals splendid relaxation after a hard day in classes. Everyone is eligible, freshmen are particularly eligible. All those who join are provided with a personal guarantee signed by everybody in sight, that plenty of good times will be forthcoming.

A general survey shows that the prospects for a lot of good noise this year are unusually good. This does not, however, imply that the membership of any of these clubs is full. It is not. The membership is a very elastic affair, anybody can join any club if he feels that his presence in that club might help things out in one way or another.

Members for the honorary musical fraternity, Pi Nu Epsilon, are chosen from these members of the musical clubs who have shown talent in their work and who have been with the clubs more than two years.

Drop in any afternoon in the week except
(Continued on page 20)

COLLEGE NOTES

Honorary Fraternity Council is Organized

NEW BOOKS IN THE LIBRARY

The majority of the books received in the library are technical, but these titles are among the recent additions of general interest:

BROWNE, LEWIS. *This Believing World*. Macmillan, 1926. A simple, well written account of the religions of the world since primitive times. The clarity of the account and absence of any controversial discussions make it decidedly readable.

CLAMPETT, F. W. *Luther Burbank, Our Beloved Infidel: His Religion and Humanity*. Macmillan, 1926. Mr. Clampett, an experienced newspaper man, had many conferences with Luther Burbank. From these notes he has given us the experiences of a man who went his own way in religious beliefs as he also did in science.

HALLIBURTON, RICHARD. *Royal Road to Romance*. Bobbs, 1925. When Richard Halliburton graduated from Princeton, his parents offered him a trip around the world. He refused, preferring a year of vagabondage on his own. The result is given in his original account.

HENDRICK, BURTON J. *Life and Letters of Walter H. Page*. Doubleday, 1921. These letters contain much of diplomatic and personal history of the "Wilson period." The writer, ambassador to Great Britain, was a capable letter writer and has given a true picture of men, events, and social conditions in two countries under the strain of the war.

HOWE, H. E., ed. *Chemistry in Industry*. Chemical foundation, 1926. A story of chemical progress through description of the processes and products of various factories. It is of interest to general readers because, despite the information, the authors have avoided technical details.

LAWRENCE, THOMAS E. *Revolt in the Desert*. Doran, 1927. One of the most interesting books about the war. T. E. Lawrence, a young Oxford graduate, worked and wandered among the Arabs for four years before the war, picking up their language and ways. The book is an account of his adventures in Arabia and Syria during the war.

MASTERS, DAVID. *Romance of Excavation*. Dodd, 1923. The story of men who have dug in the desert places for the remains of lost cities and the treasures of ancient kings. ROLVAAG, OLE E. *Giants in the Earth*. Harper, 1927. A novel of the Norwegian pioneers in Dakota. The story was first written in Norwegian and has been translated by the author who is a professor in St. Olaf College, Northfield, Minn.

HONORARY FRATERNITY COUNCIL ORGANIZED

An Honorary Fraternity Council was organized recently by the presidents of the individual honorary fraternities. The need of such a council has long been apparent. The major objects of this council as ex-

Especially to Our Freshmen

We of the Armour "Tech," faculty and upper classmen, greet you, we all have a personal interest in you. We are in search of men loyal and true. The lazy, the sneak, and the dishonest will soon be discarded. We wish serious minded young men who can work when they should and who have time for play.

Your college life should be the beginning of much that will be your real life. Here lasting friendships are formed, and what is more certain of insuring friendship than the doing of something that counts. "If you build a better mousetrap, or write a better book, or preach a better sermon than your neighbor, the world will make a beaten track to your door." Do not be discouraged because you fear that you have not the ability of another, "Genius is only the power of making continuous effort."

The world needs trained men. Prepare yourselves. Of what value is our vaunted greatness in wealth, in natural resources, and in complicated machinery, without the guiding hand! What of the "Spirit of St. Louis" without a Lindbergh at the helm! "Responsibilities gravitate to the person who can shoulder them."

Show an exuberance of interest in your college life. It is this that keeps us older men young, your youth, your endeavor to find the best, your enthusiasm. Our confidence in you is unbounded. The seniors are well founded, the juniors are to be relied upon, the sophomores are coming; but, in you freshmen, just now, are placed our hopes. And can we be disappointed when the most marked passage in the little booklet you were given to read says, "If you live so that in a few years you will be a fit companion of an intellectual, high-minded, and pure-hearted woman, you will not go far wrong."

Our greatest wish for you is that you may find real joy in your work! Do you?



pressed at the first meeting are to obtain closer cooperation between the honorary fraternities at Armour and to arouse and maintain a strong alumni interest in our honorary fraternities. The bonds of an honorary fraternity should be lasting and can be extended to its alumni by the resulting associations if a suitable opportunity is afforded. These associations are the result of bringing the men together in gatherings of a varying nature. If the alumni interest is thus stirred up it will result in a stronger

(Continued on page 20)

A WORD FROM DOCTOR MONIN

Our former dean, Dr. L. C. Monin, is now retired and living in Zurich, Switzerland. Though his walks of life are now in Zurich, his thoughts are of Armour, of the work that is progressing there, and of "his boys," as he liked to call us.

A few excerpts from his most recent letter to the seniors will bear this out. Doctor Monin writes, "When Mrs. Monin and I reached the steamer *Rotterdam* in New York harbor on the morning of April 30, we were the proudest human beings you ever saw. I was still overwhelmed with the farewell you gave me in Union Station."

Doctor Monin goes on to add, "I come today to greet you and to give you my best wishes for a successful college year. May the Institute, as always, look toward you as the mainstay of discipline, scholarship and good fellowship. I truly miss you, for the company of my junior and senior classes have been the comfort and joy of my life. In spirit I am with you and hope that all of you will reach satisfactorily the end of the college year. My love and sincere good wishes to you all."

Dr. L. C. Monin's present address is Dufourstrasse 30, Zurich, Switzerland. It goes without saying that he will be delighted to receive communications from any of his former students.

The Freshman Handshake, held in the Mission on the evening of October 5, was the first affair on the social calendar of the present school year. The Handshake was sponsored by the Campus Club under the direction of F. H. Juergensen. The freshman class turned out practically 100 per cent for their first gathering at Armour and a good many upper-classmen, lent their presence to the affair, assuring its success. The music for the occasion was furnished by the band.

President Raymond was the first speaker. He told the new men that they composed one of the finest classes ever to enter Armour. He then proceeded to point out to them what the school expected them to accomplish during their stay at Armour. Dean Palmer followed with a short address on friendships and the value of college friendships. His talk was warmly received. Prof. John Schommer was the next speaker. After recalling a few stories, Professor Schommer went on to urge the men first, to make good in their studies and second, to go out for some form of athletics

and develop physically.

These splendid talks were followed by refreshments. The concluding feature on the program was a basketball game in the Armour gym between the juniors and sophomores. The juniors were victorious by a score of 10 to 9.

The Handshake has established itself as an annual affair. It offers an opportunity for the freshmen to mix among themselves and also to become acquainted with a large number of upper-classmen. Any feeling of strangeness that any of the new men may have retained up to that time is usually routed.

THE CYCLE

Near the close of the last school year, a black and yellow volume of considerable size and weight was placed in the hands of each member of the student body. Some few did not realize that such a book existed and if it did, that they had already paid for it in their student activity fee. And very few in the school were cognizant of the fact that it represented months of labor on the part of a staff, months of collecting material, sorting and finally placing it in the most attractive form in the year book. But, under the direction of Murray Lamm, the editor-in-chief, and Elmer Kapke, the business manager, this work had been going forward during the entire year and the final product placed before the students was a worthy contribution to the student life of any college.

At a final meeting of the staff of last year's book, the following men were chosen for the editorial and business staffs of the *Cycle* for the coming year:

Editor-in-Chief.....K. H. PARKER
Business Manager.....C. D. LAMB
Art Editor.....N. YERETSKY
Fraternity Editor.....B. W. HYNDMAN
Social Editor.....G. D. HORRIS
Photography Editor.....W. H. BERRY
Athletics Editor.....JOHN EXAMER
Organizations Editor.....H. H. DOZOIS
Humor Editor.....GEORGE PETERS
Assistant Editor.....JOHN HOMMES

All sophomores and freshmen interested in working under these men, see either the editor-in-chief or one of the editors. The work is interesting and under the progressive system, offers each man a chance of making the staffs of future annuals.

As to the *Cycle* of 1928, we have nothing to say. We leave the final judgment to the student body. But we do know that every possible effort will be made to keep the *Cycle* in its rightful place among college annuals.

The usual initial rush to enroll at Armour was evident among the freshmen this fall as it has been in all previous years. More than 250 applicants were turned away. One of the finest and largest classes of freshmen to enter was enrolled this fall.

The registration at Armour this fall by classes and by courses is as follows:

	Seniors	Juniors	Sophomores	Freshmen	Specials	Total
Mechanicals	25	25	38	46	1	135
Electricals	35	46	61	62	1	205
Civils	32	22	35	44	1	134
Chemicals	13	14	24	24	1	76
Fire Protects	33	25	34	27	..	119
Architects	23	18	45	65	1	152
Total	161	150	237	268	5	821
Evening Class Enrollment.....						932

HONORARY FRATERNITY COUNCIL

(Continued from page 19)

organization and the individual benefits to be derived will be much greater.

The honorary council will sponsor large affairs that will be particularly inviting to the alumni and should result in a large alumni attendance. This will relieve the individual honorary fraternities of a great many duties and responsibilities, moreover, a single large social gathering should appeal to the alumni much more strongly than small individual affairs.

The representatives in the Armour Honorary Council are:

Tan Beta Pi.....G. H. VON GEHR
Eta Kappa Nu.....L. B. LUETH
Pi Tau Sigma.....E. B. KAPKE
Phi Lambda Upsilon.....G. A. CRAVELL
Chi Epsilon.....E. C. BACOT
Salamander.....K. H. PARKER
Sphinx.....F. D. PAYNE
Pi Nu Epsilon.....W. M. HORN
Scarab.....C. T. ST. CLAIR

The officers elected to guide the Council through the first year of its organization are:

President.....G. H. VON GEHR
Secretary-Treasurer.....L. B. LUETH

The work of preparing a council for the council is well under way. The first large gathering of alumni and actives of all the honorary fraternities at Armour will be held early in December. An announcement will be sent to all Alumni now residing in the Chicago district of this affair as soon as the date is definitely set. The active members of all the honorary fraternities are looking forward to this date in anticipation of a splendid alumni turn out and to a successful initial year of the Armour Honorary Fraternity Council.

Miss Katharine Tiplady of Lake Forest College has been appointed Assistant Librarian. Miss Tiplady has been a member of the cataloging staffs of Newberry Library, Chicago, and the St. Louis Public Library, also librarian in the government hospitals since war time.

The first class dance of the year will be the senior class dance on Friday, November 18. It is to be given in the main ballroom of the Lake Shore Athletic Club located at Pearson Street and Lake Shore Drive. This will be the first large dance to be held in this beautiful ballroom since the formal opening of the club late in September.

Jack Chapman and his orchestra will render their usual incomparable music for the occasion. The dance is under the direction of R. E. Brumund, social chairman of the senior class, and his committee. This dance promises to be the ultimate in class dances and should establish a splendid standard for the other class dances that are to follow during the year.

The first pep meeting of the year was held on Monday, October 24 at 10:30. The meeting was sponsored by the A. T. A. A. and was presided over by Maurice Tracy, presi-

dent of the A. T. A. A. The band under the direction of George Minniger played a few selections to open the meeting.

The selection of cheerleaders was the first work of the assembled student body. By popular approval J. Brady, a junior, and W. P. McDonald, a freshman, were chosen.

Captain Brockman of the basketball team announced the initial call for basketball candidates and spoke of a promising team this year. He further asked the student body to support the team at their home games.

Coach A. A. Stagg, Jr., then spoke of the prospects of our track and cross-country teams. He also asked for more candidates for these teams. Captain Deiwert seconded Coach Stagg's call for additional track candidates.

Coach Kraft then said a few words in regard to baseball and urged the freshmen particularly to come out in the spring. Coach Leigh of the golf team told of the splendid success of the golf team last June at the Mid-Western Golf Tournament. Coach Tibbals reminded the student body that the tennis team hadn't lost a match in three years and there is a bright outlook for the coming year.

The speaker of the day was then introduced. He was none other than our own director of athletics, Prof. John J. Schommer. Professor Schommer spoke of changes in football rules and possible future arrangements with Chicago and Northwestern for football tickets, bringing to a conclusion, one of the best pep meetings ever held at Armour.

SOCIETIES

(Continued from page 18)

cept Friday, at five o'clock, and enjoy a rehearsal

At the meeting of the Musical Clubs, the following officers were elected for the coming year:

President.....W. M. HORN
Vice-President.....G. H. SMITH
Secretary-Treasurer.....G. A. PETERS
Business Manager.....WILLYS THOMAS
A. T. A. A. Representative.....ALAN TULLY

STRESS AND STRAINS

"Tap, tap! Stomp off and let's go," says Thornton, and the Stress and Strains, with nine new men picked from a world of offered material, swing into harmonic rhythm. Those at the head of the organization were a bit worried at the beginning of the semester as to just how some of the gaping holes left by the esteemed seniors of last year were to be filled. But at the very first rehearsal there were more instruments offered than could be accommodated in an orchestra of this type. Once again we have our complete instrumentation, with a full saxophone choir, brass choir, and percussion ensemble. Three violins have been added to lend a bit more finish to the work of this symphonic jazz organization.

Thornton J. Clark is once more the presiding chief and if anyone should happen to ask, he wields a wicked stick and even more wicked saxophone obligato. Thornton has had much practical experience in the field of dance music and makes it invaluable to the organization.

THE ARMOUR GLEE CLUB

At the first rehearsal of this season, Dr. Daniel Protheroe, director of the Glee Club, made this statement, "I am glad to see that we are starting the year where we left off last season, instead of starting at the beginning again. That is fine."

(Continued on page 32)

FRATERNITIES

A True Friend to a Man is a Friend to All His Friends—Wycherley

TAU BETA PI

Beta chapter of Illinois has already begun what promises to be the most active year of its existence. The active members number thirteen, in keeping with the policy of electing more men in the junior than in the senior year. Numerous smokers and banquets have been promised and a fine spirit prevails.

The delegates to the national convention at Columbus, Ohio, E. B. Kapke and E. E. Gramer, have returned with very favorable reports. Brother Gramer was elected secretary of the convention.

The officers for the present year are:

President.....G. H. VON GEHR
Vice-President.....K. H. PARKER
Recording Secretary.....E. E. GRAMER
Corresponding Secretary.....E. C. BACOT
Treasurer.....E. B. KAPKE
Cataloguer.....H. O. SNEDIKER
Correspondent, The Bent.....L. E. JOHNSON

SPHINX

Sphinx, the oldest honorary fraternity at Armour, is an association of men who have distinguished themselves by their work on the student publications.

This group has been responsible for the adoption of the progressive selection system which now governs the selection of members for the staffs of the publications. This system has made it possible to choose staff members from experienced material.

The best time to start working for a staff position is in the freshman year. Through a process of gradual advancement, experience is obtained and an editor or a business manager is made.

The officers of Sphinx are:

President.....F. D. PAYNE
Secretary-Treasurer.....R. E. BRUMUND

CHI EPSILON

The actives of Chi Epsilon look forward to an interesting year in school. At the end of last year, we elected the following officers:

President.....E. C. BACOT
Vice-President.....W. W. KERR
Treasurer.....W. A. ANDERSON
Recording Secretary.....C. A. GUSTAFSON
Corresponding Secretary.....C. T. VANDER MOLEN

On the night of October 26, the chapter held a smoker at the Sigma Kappa Delta house, where the members enjoyed a few card games and other entertainment. We had as our guests several of the faculty members, who forgot the trials of school for the evening. On this evening, J. B. Lodeski, W. F. Straits, and Alan Tully took on the responsibility of wearing the purple and white pledge ribbon of Chi Epsilon.

ETA KAPPA NU

The past year has been a very successful one for Delta chapter. The new school year finds us as prosperous as ever, with a brand new set of officers planning the year's work. They are:

President.....J. B. LUETH
Vice-President.....L. J. ANDERSON
Corresponding Secretary.....G. H. VON GEHR
Recording Secretary.....GEORGE KLEINERT
Treasurer.....H. T. DAHLGREN
Associate Editor, The Bridge.....W. J. ZENNER

The first problem of the year was that of redecorating the chapter rooms and with no pledges around, this was indeed a problem. However, with fine cooperation from the Institute employees, coupled with native ingenuity, engineering ability, and some Hebraic philosophy, the task was soon completed.

The following men were pledged to Eta Kappa Nu: L. F. Bernhard, A. H. Everly, R. J. Guenther, B. W. Hindman, W. A. Neath, Paul Steinert, and G. O. Vandever.

The national convention of Eta Kappa Nu was held at Cincinnati on November 11 and 12. President Lueth and Vice-President Anderson were our delegates.

PI TAU SIGMA

Delta chapter of Pi Tau Sigma, national honorary mechanical engineering fraternity, opens its fourth year at Armour with an active membership of five. The tenth annual convention was held at Purdue University on October 28 and 29, the local delegates being Brothers Sandborg and Clark. At this convention, they found a fraternal spirit and a mutual interest in the promotion of the high ideals of the mechanical engineering profession.

The officers for the coming year are:

President.....E. B. KAPKE
Vice-President.....E. M. CLARK
Recording Secretary.....L. E. JOHNSON
Corresponding Secretary.....O. W. SANDBORG
Treasurer.....R. J. GEITMANN

PHI LAMBDA UPSILON

Phi Lambda Upsilon is preparing for an active season. Last May the following men were duly initiated: A. D. Watkins, C. P. Morgan, J. W. Heimaster, F. O. Johnson, and U. G. Naeff.

After the initiation, the newly elected members were honored by a unique banquet at Julien's. The new members entertained the chapter and the alumni by presenting some interesting and "educational" papers. The alumni turned out in good force. The work and the business of the chapter will be carried out by the following officers:

President.....G. A. CRAWPLE
Vice-President.....J. W. HEIMASTER
Treasurer.....F. O. JOHNSON
Secretary.....U. G. NAEFF

SALAMANDER

Salamander was founded in 1923 by a small group of men in the department of fire protection engineering, for the purpose of promoting interest in high-scholarship and original work at the Institute, as well as to provide a medium for the furthering of good fellowship in the field of fire protection both in school and in the field-work of the alumni.

The present active members of the chapter believe that the original purpose of the fraternity has been well carried out. In addition, many excellent contacts with leaders in the profession have been established.

At the spring election of Salamander, the following men were chosen to wear the key: D. B. Clark, R. K. Langan, H. O. Snediker, O. R. Besch, and W. M. Horn.

The fraternity cooperated with the other honorary organizations in the formation of an Interhonorary Fraternity Council.

A smoker was held on the evening of October 27 at the Triangle House, and was attended by many alumni and honorary members. Those who attended the smoker expressed the hope that they might enjoy similar affairs in the future.

PI NU EPSILON

In January, 1927, a new honorary fraternity came into being. The name Pi Nu Epsilon was taken by the organization, the object or purpose of it being to promote interest in the musical activities in school, as well as provide a means of giving recognition and honor to men whose ability and musical talents show themselves to be considerably above the average.

The members of the active chapter also feel that the meetings of the fraternity will be a valuable medium for the exchange of ideas for the conduct and maintenance of the various musical organizations at the Institute.

SCARAB

The life of Edion Temple of Scarab is unlike that of the other honoraries at Armour, in that we are in constant contact with the older Scarabs in Chicago by means of the well known Scarab luncheons. These luncheons are held every second and fourth Tuesday noon of each month, at a loop cafe. They are well attended by the older men of previous classes and unanimously attended by the active chapter. We find that this sort of activity does more for each member than any series of smokers or other bores, and is easily the most popular.

PHI KAPPA SIGMA

Alpha Epsilon chapter held its usual fall house-cleaning party four days before school opened. Washing, scrubbing, painting and

polishing constituted the major part of the celebration. With our house in good condition and eighteen men returning to school, Phi Kappa Sigma is looking forward to making its thirtieth year at Armour a most successful one.

We are proud of the scholastic achievements of our men of last semester. The average of some ten men living in the house is over ninety per cent. We hope to raise this record this year.

Our social activities opened with the rush dance on October 8. Then there were Parents' day, a Sunday on which we entertained our parents, and our usual Halloween party.

We are proud to announce the pledging of the following men: Elmer Anderson, Dean Banta, Clarence Brown, Carl Christensen, Arthur Faupell, John Hurley, Walter King, Maxwell Larkin, Alfred Schrage, Emerson Squired, Dean Urmon, Henry Weis, Robert Wilson, and Charles Woods.

Alpha Epsilon extends a sincere wish that this will be a successful year for everyone.

DELTA TAU DELTA

The democratic spirit of Armour prevails in her fraternities, and their influence on the development of character and understanding in a man cannot be questioned. A man's fraternal relations with his chapter do not end with his graduation but continue when he gets away, and the extent of this relationship may be said to be directly proportional to the interest the active chapter takes in its alumni.

Activity about the house was most sincere this fall and with the whole-hearted co-operation of the active members and alumni we were well prepared to entertain the freshmen and carry on our rushing.

Gamma Beta of Delta Tau Delta announces the pledging of the following men: David Baldwin, Louis Henson, Elmer Holin, Frank Ichmael, William Jervis, John McLane, Paul Malm, James McAlear, Harry Nissen, and Theodore Schueler.

THETA XI

About the middle of September signs of feverish activity at 3305 Michigan Boulevard heralded the fact that the old gang was back. The house was soon put in readiness for the coming year, the work being livened by wild yams of adventures which each had experienced during the summer.

School opened and all settled down to hard work and study. Rushing season came in the third week. Two house dances and an informal dinner and dance at the Davis House were given. A yachting party and a smoker were among the other affairs. After a very successful rushing season, we are proud to announce the pledging of: L. W. Bosker, H. Dean, G. A. DeBolt, R. A. Dolbeer, C. R. Hillam, F. James, W. A. Johnson, P. S. Kjellgren, R. J. Serson, W. Schrader, H. Smethells, and W. E. Schirmer.

The next affair of note was Halloween. A dance was given at the house on October 29th in honor of our pledges. Pumpkins, corn stalks, and branches burnished with the fire of autumn, lent color and charm to the dance. Goblins and witches reigned supreme, for it was the one night in the year when all was make believe.

SIGMA KAPPA DELTA

Sigma Kappa Delta extends a hearty welcome to all of the students of Armour Tech. We have twenty-five active back with us this year. Brother Groschup being the only one who did not return. He is trying out his schooling on some architect and we wish him success. About a week before school started, a first aid call was sent out for volunteers to clean up the house and put it in condition to entertain the frosh when the time came. Quite a few of the fellows showed up to swap yarns, and some of the cleaning was finally done. The House was finally put in order at school time.

We held a rush dance and also a rush smoker during the open season. Brother Huidman put over a good dance, one that will always be remembered by the members and rushes. This was the first of many we hope to enjoy during the year. We also had nightly entertainment and theatre parties during the rushing season. We take great pleasure in announcing the pledging of the following men: H. Fox, G. Gibson, Charles Hawes, R. E. Kibbourne, R. H. Kutterer, P. T. McDonald, W. R. Mancke, W. E. Penfold, and Hugo Rymke.

PHI PI PHI

The opening day of school found the members of our chapter returning with their usual enthusiasm and pep. It is hardly necessary to say that a great deal has been accomplished since that time.

At this time the active members take pleasure in announcing the pledging of the following men: G. E. Davidson, T. J. Janowski, T. McArdle, M. McCarthy, J. T. McKana, C. J. Robin, C. M. Olson, S. A. Ott, A. O. Wageman, and W. P. Winkler.

Gamma's first dance of the year was given on October 8 and was acclaimed by alumni, of whom a large number were present, as one of the most successful affairs the chapter has ever given. This was just a beginning, however, and many plans are being arranged, for those which are to follow.

On the evening of October 13, an enjoyable smoker was held at the house, entertainment being furnished by some of the men in the group. It was diversified and ranged from a xylophone concert to a heavy-weight boxing match.

Gamma takes this opportunity to announce the return of three of its active members, Wallie Anderson and Ollie Cremer, architects, and Bob Brown, a chemical.

Phi Pi Phi extends its best wishes to all the members of the faculty and students, and a special word of welcome to all new students.

RHO DELTA RHO

The school year finds us back at our old stamping grounds, 3333 Michigan Avenue, with the boys all keyed up with pep after their recent summer vacation. The first few days were spent putting our house in order and getting programs straightened out.

During the past few weeks we have had the good fortune of having several of our alumni stop in to wish us luck. S. Lickton, W. Benjamin, A. Zimmerman, and B. Orwicz stopped in to say that they are now employed by the city.

Rho Delta Rho takes pleasure in announcing the pledging of the following: M. Boshes, D. Kammerlink, H. Kaynor, M. Moscovitz, and H. Yampole.

SIGMA ALPHA MU

We return to school with plans for greater activity both inside and outside the Institute. All the fellows held positions during the

summer months, and between their working hours, we had several opportunities to hold meetings in addition to having three parties. Our dance at the Edgewater Beach Hotel closed the summer social season.

Our numbers were reduced by the graduation of Frates, Buchsbaum, Chayes, and Kohn, whom we wish a sure and speedy voyage to success. Ruman and Polacek have decided to try their hand at hard work for a semester before returning to school. The outlook, however, still is bright and we wish other fraternities a happy year.

TRIANGLE

Again the college year opens, after better than a three months' vacation. From all appearances this vacation has done no harm whatever to the twenty actives who returned this fall to take up the duties of school. Our actives are all hale and hearty and rarin' to eat up all assignments given them.

Our social season began early this year with the annual homecoming party from September 12 to 29 inclusive. However this party was not a well dressed affair for the appearance in overalls, coveralls, old clothes, and such was a common sight at our reception. Each active was greeted as he entered the door of the house and presented with a bucket, paint brush or what have you. Our decorating looks like the work of a master instead of just amateur painting engineers. All in all, the gang did well on the decorating problem and we feel justified in boasting of our house.

Through graduation we lost quite a few men, but we have a mighty lively group left. One of our new alumni has placed quite a distance between the house and his place of business. Red Harrower has taken a position with the Firestone Rubber Company and is on his way to Liberia, Africa.

In regard to social functions for the year, things are getting well under way. With a few smokers, theatre parties, and a house dance, we are progressing fast in this field. We are proud to announce that Armour chapter has been presented with the Schwerin scholarship cup for its good standing. This cup is a floating one and is awarded each year to the chapter in Triangle that has the best average.

There have been big doings in the Triangle family since the last edition of the ENGINEER, most important, the annual convention, which is to be held here again this year. During the summer months the National Council had a meeting in Chicago and we are glad to have had the opportunity to entertain them.

At this time, Armour chapter of Triangle wishes to extend a most welcome hand to all freshmen. From all appearances, the class looks good and we hope they will keep the high ideals of Armour in their minds.

We are pleased to announce the pledging of the following men: H. A. Bailey, R. C. Barber, W. S. Denning, D. M. Fetterman, M. K. Loomis, G. Reuter, and H. A. Simms, Jr.

BETA PSI

At the beginning of another year, Beta of Beta Psi wishes to extend a welcome to the incoming class of freshmen and to wish them success.

After a week of scrubbing and cleaning, Beta Psi chapter house was discovered still at its old location. Although we were forced to listen to some very lurid tales during this period, a little grain of salt with each one brought everything to the proper level.

(Continued on page 38)

ATHLETICS

Sophomores Win Freshman-Sophomore Track Meet

TENNIS

Professor Tibbals has the tennis team for the next year. For the uneducated that means that the man who has been coach of the teams which have lost but one match in the last three years will again be the guiding spirit for the Tech teams. They indeed have set a challenge for the other teams. Last year, out of ten matches played, Armour lost but one and that to Detroit City College, the match having been played indoors on account of rain. Let that may sound like an alibi, we may state that this same team won the Michigan Indoor title in doubles. We are not ashamed to lose to such a team. Of the sets played, Tech took 31 out of a possible 62. George Jennings, the captain, lost but one set all year in the singles. For his work in the past three years he also has been awarded a major letter. It must also be remembered that George was also playing a regular position with the ball team along with his tennis matches.

GOLF

The golf team this year will again be coached by Professor Leigh. There are two men back to start the team off: Henry Bates, the captain, and Henry Christianson. The squad turned in four victories out of eight matches last spring, which is a mark to be proud of as some very high class meets were contested. There will be a fall tournament this year to get men out but at this time, it is impossible to forecast the outcome. The team will miss the services of Captain Urban and Vic Peterson, two of the best players Tech has ever had. Urban was awarded a major letter for his excellent work on the squad throughout his four years of school competition. This is the first time a minor sport man was ever shown this honor. The team won the Central Intercollegiate Tournament at Milwaukee last summer by 38 strokes. In addition Urban was a third, Christianson a fourth, and Bates a fifth in the individual prizes. All the members of the team received gold medals for their efforts.

BASEBALL

The baseball team will be led by Rossetti this spring and coached by Bill Krafft. Last spring Krafft turned out the best team Tech has had in ten years. They won nine out of fourteen games and had one tie, finishing with a percentage of .692. During the season Armour scored 88 runs to their opponents' 62. Eleven major and two minor letters were awarded to members of the team for their work. The team has suffered somewhat by graduation, losing Captain Hofer, Alexander, and Kuffel. A new luminary has appeared in the person of King Simpson who entered school in the fall of 1926. King played basketball with the varsity but his real worth to the school was apparent when he started to pitch a few ball games. He looks the equal of Alexander so much is expected of him.

OUR VARSITY CERTAINS

BASKETBALL

E. William Brockman

"Brock," as he is familiarly known to his mates in school and in the gym, will lead the basketball team to all its victories this year. Tall, sandy haired, and well able to take care of his end of the game in most any sport, he is indeed a leader for the team.



E. W. Brockman.

Brockman was born in 1903 in Chicago. He attended grammar school here and upon graduation, entered Pullman Tech, winning letters in basketball and football the first year. After that he transferred to Bowen and won five letters in basketball and football. Coming to Armour in the fall of 1924, he played with the freshman basketball team that won the school championship and with the likewise victorious basketball team. Naturally he went out for the varsity with the result that he has since won three major and one minor letters in basketball. Brock originally started school with the group of young electricals but along with Augustine, basketball captain last year, he changed to the fire protection course. Due to this change and the fact that he missed some time from school, he will not graduate this year—which is fine for the team. It might be mentioned in passing that Brock did not return to school till the second semester last year and played only the few remaining games, hence the minor letter.

SWIMMING

The swimming team will have Coach McGilivray again this year. They will use the University of Chicago pool, starting work some time in December. The team has lost a few men but will be strengthened by the return of Bob Brown, a former letter man. All swimmers are urged to come out for practice as the team is in need of men in nearly every event.

FRESHMAN-SOPHOMORE TRACK MEET

At the Freshman-Sophomore track meet, held at Ogden field on October 17, the sophomores upheld the time-honored tradition of defeating the freshmen. This year the final score was 35-28. The freshmen will have to go about with bowed heads until Circus Day, when the sack rush will offer an opportunity to square accounts.

Rain and cold weather on the day of the meet made it necessary to omit certain events.

A fairly representative number were held. As usual, a few frosh stars were uncovered. The two most promising recruits are Fox, a sprinter, and Timmerman, a middle distance runner. These two tied with eleven points each.

Results by events are as follows:

100 Yd. Dash	
1—Fox (F)	
2—Timmerman (F)	
3—Young (F)	Time 11:3
220 Yd. Dash	
1—Fox (F)	
2—Timmerman (F)	
3—Montgomery (S)	Time 26:3
880 Yd. Run	
1—Timmerman (F)	
2—Smith (S)	
3—Austin (F)	Time 2:31:4
1 Mile Run	
1—Smith (S)	
2—Kuterul (F)	
3—Dahlke (S)	Time 5:33:2
Javelin Throw	
1—Trognitz (S)	
2—Dahlke (S)	
3—Romine (S)	Distance 120 ft. 10 in.
High Jump	
1—Montgomery (S)	
2—Trognitz (S)	
3—Fox (F)	Height 5 ft.
Shot Put	
1—Romine (S)	
2—Montgomery (S)	
3—Zeleny (F)	Distance 29 ft. 2½ in.

HONOR A SOCIETY

The Honor A Society, composed of winners of the major A at Armour, elected the following officers at their last meeting:

President.....F. D. PAYNE

Vice-President.....R. E. BRUMUND

Secretary-Treasurer.....D. G. SKAER

It was also decided that in the future all letter men may be admitted to the society, with a distinctive watch charm to be worn by the winners of minor letters. The vice-president may also be a minor letter man. By this decision all athletes may now meet in a more compact body. Late last year an athletic banquet was held at the Theta Xi house. All the coaches and some thirty men were present. Such enthusiasm was shown that it was decided to make this an annual affair.

The members may be distinguished by the small gold "A" watch charms. Stars on various parts of the "A" show the number and kind of letters a man has been awarded.

(Continued on page 38)

THE ROOT OF TECH.

IT'S "SQUARE."

EDITORIAL EXTRAORDINARY

In making our initial bow, all we would ask is an obliging guffaw or two. And now as to how it all came about.

"H. E.," said the Chief Ed., "you are absolutely funny." "Who—me?" protests H. E. "Yes, you," he snaps back accusingly, "although you may not know it—yet." We waited with bated breath (is that right?) while Ye Ed. thumbed his suspenders and rocked to and fro on his trusty office chair. Finally he broke the suspenders—(suspense we meant) and announced the verdict:

"We, the jury, find you guilty of imbecility in the first degree—the punishment to be the getting up and foisting upon the reading multitude a page—preferably a page of humor, if possible, a page of funny humor, and if mayhap it can be brought to pass, a page of witty humor." And he gave us the Key to the City.

But that isn't all—descending from Sinai, he also handed us the Law, which, neatly typewritten by the Seraphim, reads thusly:

Humor

1. Do not print profanity.
2. All stories derogatory to the Institute, faculty, the clergy, and the eighteenth amendment are barred.
3. All copy should be typewritten, the average line being about 40 spaces long.

And now, how the heck are we gonna be funny?

Don't Ask?

Well, we decided to drown our sorrows, but our favorite bootlegger was out looking for something to drink, so we decided to eat ourself into a state of stupor, besides we reflected, we would thus escape any allusion to the eighteenth amendment. Wotta Life!—Wotta Life! So we traipsed airily into a swell feed joint (Adams and Wabash), and picked up a menu. Also tried to pick up fair (more or less) waitress, but failing this, returned to aforementioned menu, blushing profusely, when our questing gaze encountered:

Oysters—Still Scenting of the Sea

Day before yesterday as the sun was sinking in the West these beautiful oysters were having their evening frisk on the sandy bottom of Delaware Bay. Cruel fate, by the hand of man, transformed this joyful frolic into an appalling scene of desolation. These innocent creatures were seized, shucked and shipped to us immediately—and here they are:

DELAWARE OYSTER COCKTAIL WITH A WONDERFUL, SNAPPY SAUCE, SERVED IN A SILVER CUP, WITH CALIFORNIA LEMON, SALTINE CRACKERS AND FRESH BUTTER 25c

So we had a cocktail (oyster) after which

we could see nothing funny for a week. Then we got a hold of a copy of the *Chicago Tribune*. Here we observed a column called the "Wake of the News," conducted by a chap name *Help! Help!* Now that's what we call a darn good idea, says we to ourself. If a professional humorist gets by being funny by yelling for Help! maybe we can too, so:

HELP!—HELP!

And we mean it. We shall try to make this page light, airy, breezy, or what have you, and all without Menckish remarks ancient Clergy, Volstead, or our own dear Profs.

But we do expect to make a success of this with the approbation and assistance of our readers. Therefore we solicit the Cream of Armour's wit.

And now for the deluge!

GRIB WIDTER

I sdiz a sdoze ad sduz a sdeez;
Ib goig to pud od by log unaware.

Sprih haz went and Subher too,
Flowers bright and birds of blue,
Autubd leaves are browd and gode,
Ad here Ib got a dab good code.

Idiad subher sud bey shide,
Adtodio he starta da vide,
Stagg's teac agaid is strog and bode,
But all Ib got is a dab good code.

Dey'll laugh at be dowed at da gyb
Cause dow dese guys all got dere vib;
but waid utdil grib widter cubs
and ded dese guys dat sig ad hab,
will sdiz a sdoze ad sduz a sdeez;
ad pud on dere log unawares.
Ad ded I'll laugh. Ha! Ha!

—the barb.

NOTICE!! FLAMING COLLEGIANS

Sign along shady lane skirting the snug shores of Lake Mendota, on the campus at Madison, Wisconsin:

Wild Life Refuge

It'll End When They Quit

Civilization, as such,
Started about the time
Women began calling
Their worst enemies
"My dear."

—Arkansas Gazette.

"Did you ever see a three dollar bill?"
"No!"
"Well here's one from my dentist."

—A LA CARTE.

MY FRIENDS

WALTER HENDRICKS

*My friends go up while I do dozen.
They soon are men of great affairs.
They ride like lame men into town.
I amble out to shake off cares.*

*I know these legs of mine are legs.
They do not know who walk on wheels.
For all they know their legs are pegs.
They know not how this fine earth feels.*

*We meet at times on some broad road.
They pass me by in state like kings.
But they have hearts that bear a load,
While I have one so light it sings.*

My Wife's Gone to the Country!

Wanted, Student:—For some cooking and housework. Board, room, and some cash. Professor's house. See P. C. in Mech Lab Office.

A SCOOP!

Having learned through private channels, we are letting you in on the ground floor. Here's the dope:

Ostensibly in order to stimulate travel, and to enhance the scenic attractions of our fair city, the Traction Barons (business of coling mustache), have laid secret plans to conduct a stupendous contest. We say *ostensibly* because we know that they have an ulterior motive. Prizes will be awarded to everybody. There are no blanks, so take note—take advantage—thank us. For every 200,000 transfers turned in, these very self-same wily Traction Barons will award to you absolutely free of charge, one—marvelous—life-size—hand-painted—picture of your favorite motorman.

SMOG

*Flaky grey
scollops the haunt of the rising sun.
The dead city awakens.
Shadowy figures
slink through sombre canyons
and melt into the gloom.*

*A shroud blots out life
making night.
And the slithering, slimy fog
claws at us with cold
clammy fingers.*

*We shiver
in the frigid breath
of Death.*

H. P. E.

Hard as concrete, you say?
Yeh. Fact is, I took her for a walk.

—Stanford Chaparral.

ENGINEERING NEWS

THE BUCKINGHAM MEMORIAL FOUNTAIN

The World's Largest and Finest Fountain

By H. E. LARSON, '28

THE Buckingham memorial fountain is the jewel of Chicago's lake front. It is truly a thing of beauty, sparkling into the afternoon sun, piercing the evening's darkness with living color.

The fountain is a tri-memorial. It is a tribute, first, to the man for whom it is named; it is a triumphant realization of an architect's dream; and it stands as an aesthetic achievement of engineering.

The story of the origin of the fountain is a tale of happily timed incidents. In the original plan of the South Park Board for the beautification of Chicago's lake front, \$50,000 was budgeted for the erection of a memorial in Grant Park on the site now occupied by the Buckingham fountain. Before active steps were taken, however, Miss Kate Buckingham conceived the idea of a memorial fountain in honor of her brother. In her search for a site, Miss Buckingham obtained the permission of the South Park Board to erect the fountain where it now is, and further, was allotted the \$50,000 intended for the original memorial to be used in partial defrayment of the \$700,000 cost of the present monument.

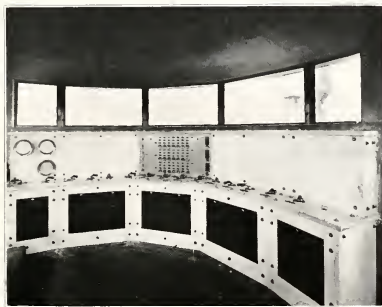
The responsibility for the details of design and construction was assigned, by Miss Buckingham, to the firm of Bennett, Parsons, and Frost, Chicago architects, who enlisted Alvord, Burdick, and Hawson, also of Chicago, as consulting engineers. Studies were made and measurements taken of the "flashing fountains" of the garden of Versailles for there was no fountain in this country that equaled them in beauty. As a result, the Buckingham memorial resembles slightly the famous Latona fountain at Versailles but it is more than twice as large and much more elaborate in chromatic and hydraulic display.

The three terraces or basins of the fountain proper are built of pink Georgia marble. The lower basin is one hundred feet in diameter, the second basin sixty feet, and the top basin twenty-four, each supporting the other, and the whole set in a giant pool three hundred feet in diameter having a capacity of 3,500,000 gallons of water. The rims and sides of the terraces are richly embellished with sculptured designs and sea shells, through which the water that collects in the basins returns to the reservoir, the shells being so designed and connected with the inner basin that all shells discharge equal streams. The high polish of the marble is preserved and augmented by a coating of wax that is applied during the operating period of the fountain.

Concealed in the basins are the pipes that feed the various jets of the terraces. The nozzles from which the jets emerge are adjustable, permitting easy setting for the most advantageous display. An eight inch pipe for the main jet is installed in the heart of the fountain. The nozzle for the ninety foot main jet is of unique design resembling

We are indebted to C. W. Farrier, '16, for the information contained in this article. After following a winding trail in search for a man who could give authoritative information regarding the Buckingham Fountain, we were fortunate to find an Armour man at the end.

a bell with the water spouting from an orifice in the top. The diameter of the orifice is two and one-half inches while that of the emerging jet is two inches, a coefficient of contraction of about eight-tenths. Since



The switchboard. The operator has an unobstructed view of the fountain through the windows above the board as he manipulates the various controls.

most of the data concerning nozzles is very incomplete it was found necessary to develop and determine nozzles best suited for fountain display.

The hydraulic display is not confined to the terrace. Four isolated jets, each a cluster of small jets, emerge apparently from the surface of the pool. Then too, there are the four pairs of sea horses; from the mouth of each a jet of water shoots toward the fountain. These sea horses were cast in France of a special bronze, and are each more than twenty feet in length.

It is true that the fountain is a marvelous sight as the afternoon sun turns the water jets into streams of sparkling diamonds. It is most beautiful at night, however, when banks of multicolored flood-lights play upon the dancing waters, transforming the diamonds into emeralds, rubies, and sapphires.

The conduit containing the wires that lead to the red, blue, and amber reflectors is concealed in the basins with the water pipes. The total illumination is furnished by eight hundred 75-watt and eighty-four 500-watt lamps, each lamp being protected from contact with the water by a specially designed water-proof, copper spun, cadmium coated reflector. This reflector unit was developed by the men who had charge of the fountain installation to meet the rigid requirements of under-water illumination.

After seeing the fountain in full display, marveling at the changing colors and the ninety foot leap of the main jet one begins to look for the pulse and control of it all. On the edge of the pool southeast of the fountain one sees the roof of the pump and control room.

Inside, the sound of churning pumps fills the subterranean chamber. There are three pumps having a combined capacity of 14,000 gallons per minute. The pumps draw water from a suction chamber, which is located adjacent to the west wall of the pump room and into which the reservoir pool water is piped, and discharge into a common header. For minor display only one 7,000 gallon per minute pump is required. The main jet of the major display alone requires one 1,600 gallon per minute pump, at a 100 foot head.

All main valves throughout the fountain are operated by hydraulic remote control valves placed on a ledge in front and on either side of the main switchboard, which may be operated with the fountain in full view. Each gate valve is opened or closed by a piston moving in a cylinder, the flow of water into which is determined by the operating control valve. These valves are of special four-way design to permit the necessary reversal of the water.

It was in the design of the electrical switching and dimming equipment that the greatest departure from standard practice had to be made. The twenty-one unit dimmer bank is the first of its kind and the operating control

board was practically built of the job. The dimmer bank is so designed that a complete cycle of change in intensity of illumination is obtained in one and one-half minutes. At the instant of closing the starting switch on the control board, 40 per cent line voltage is applied to the lamps. During the first half-minute the intensity of illumination is increased until full line voltage is applied to the lamps. Full intensity is maintained during the next half-minute, the dimming process being completed in the last half-minute. Whether the lights are completely extinguished at the end of the period or whether the cycle is repeated depends upon the setting of the switches on the control board. It is also possible to arrest the motion of the rheostats at any point during the process of brightening or dimming.

The control board has a separate bank of switches for each color, red, blue, and amber. Each bank consists of three rows of switches. There are pilot lights on the board from which the intensity of illumination of the various fountain units, such as the sea horses or isolated jets, may be ascertained.

The operation of the control board is identical for each color bank. Let it be desired, for example, that the red lights be lighted, throughout the whole fountain. If

(Continued on page 38)



Undiscovered country in industry

THE globe's surface no longer holds much undiscovered country, but the pioneer-minded man can still find plenty of it in industry—particularly in the telephone industry.

In the Bell telephone companies throughout the entire country, men are now exploring the 1930's and

40's and 50's, charting the probable trend of population and the requirements for service.

In research and operation, and in telephone manufacture as well, the Bell System takes seriously its responsibility to give adequate service now and to gird itself for a long future.

Please mention The Armour Engineer

In research: The Bell Laboratories are continually developing new apparatus, which in due time results in improved or extended service.

What was undiscovered country yesterday is charted today—carrier telephony, long distance telephone cable, transatlantic telephony. And this work goes on, to add new meaning to "Communication."

In plant operation: That the telephone operating companies can meet now the increased need for their service is largely because they had the foresight to provide for present requirements years ago.

Always there will be new country, bounded by such questions as, "What new uses of the telephone can we develop? How can we make telephone service more valuable?"

—and in making telephones at Western Electric

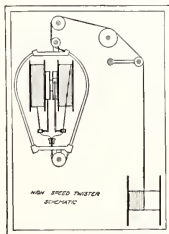
It has been the responsibility of Western Electric to develop the machinery of telephone production and to keep improving it, working out better and quicker and more economical methods.

One instance of this is seen in the copper wire mill. A few years ago it became desirable for this company to produce a good part of its own rod and wire, and to that end Western Electric engineers mastered the technique of this additional industry. Not only that, but they had the courage and the vision to attempt certain departures from existing practice, with the result that the Western Electric mill has contributed new standards to an old art.

Following the wire from the mill to the manufacture of lead-covered cable, you will find more instances

of pioneering. To insulate and twist the wires, refinements in machine design have been introduced which reconcile two important factors—high speed and high quality.

And throughout the entire works, from the purchase of raw material, through fabrication, to the final test of the product, Western Electric never takes the conventional stand of letting well enough alone.



This wire-twisting machine, designed by forward-looking Western Electric engineers, operates at a speed six times greater than the one it replaced.

BELL SYSTEM

A nation-wide system of 18,000,000 inter-connecting telephones



"OUR PIONEERING WORK HAS JUST BEGUN"

Please mention The Armour Engineer

MERCURY-ARC RECTIFIERS

(Continued from page 13)

was accomplished by placing the rectifiers in the arches of the elevated structure, a procedure which would have been impossible with any other type of converting unit.

Due to the fact that the rectifier has an ampere rating rather than a watt rating, and since the losses in the arc are practically the same for any direct current voltage, this device lends itself admirably as a high-voltage converter. Not only does its efficiency increase with higher voltage, but also the capacity per container, and this without any alterations of importance, up to 5,000 volts direct current. The limited use of direct current for heavy traction work has been largely due to the fact that no efficient converting device for high voltages was available. Heretofore, 1,500-volt direct current conversion was likely to be considered critical from the point of view of the converting device, except in the case of motor-generator sets. Above that voltage, the use of a synchronous converter was out of question, and the problem could be solved only by the use of motor-generator sets, which involved a great sacrifice in efficiency and in cost.

In order to bring out the main advantages, an electrified line with a 3,000-volt direct current system will be considered. This voltage cannot any longer be considered high with reference either to rolling stock or catenary equipment, as is well demonstrated by railway electrifications for this voltage both on this continent and abroad. The main advantages are:—

First, the converting equipment is about half the cost of a motor generating set,—which is the only other conversion device which can give such high direct current voltages,—and even less, as a saving will also be effected due to simpler substations and simpler control equipment.

Second, elimination of practically all feeder cables, because the rectifier can be located at points with the heaviest load peaks. Furthermore, centralization of the converting equipment is not necessary. The reason for this is largely due to the fact that the control equipment and the substations necessary to house a rectifier are less complicated and cheaper than for motor-generator sets.

Third, smaller losses in trolley lines, since a greater number of substations with closer spacing do not materially affect the cost of electrification. This is due to the same reason as mentioned above.

Fourth, doing away with special control devices, supervisory equipment, etc., since rectification at high efficiency is made possible at all loads, and therefore floating on the line of rectifiers does not impair the economic aspects of the rectifier installation. Control can be easily accomplished by a simple device, as, for instance, by a time-switch which would connect or disconnect, respectively, the rectifying sets from the trolley line at certain predetermined intervals.

Most of the above mentioned high-voltage direct current electrifications employing mercury-arc rectifiers as a conversion device were the result of studies taking into account the above considerations. Rolling stock for voltages of 3,000 and 4,000 volts has proven to give full satisfaction in practical installations, both on this continent and abroad.

The writer is fully convinced that in the not far distant future the rectifier, with its extreme adaptability to higher voltages, will revolutionize the electrification programmes as well as the system questions so long discussed in every country.

ARMOUR INSTITUTE OF TECHNOLOGY LOSES TWO LOYAL FRIENDS

(Continued from page 7)

and great ability. His name will endure as one of the great business men of our times."

Arthur Reynolds, president of the Continental and Commercial Savings Bank: "Mr. Armour was for a long time a large stockholder in the Continental banks. He was a very kindly man. He had a generous and wholesome interest in his employees. As president of Armour and Company he was very influential. He had a large part in building up one of the city's greatest enterprises. He was a man who was not too busy to have an active part in the problems of the city in which he lived. He was identified with many of Chicago's largest projects. People of all walks of life loved and respected him."

Thomas E. Wilson, president of Wilson and Company: "The entire industry has lost a great champion, one deeply admired and dearly loved by those who really knew him as I did. His passing at so young an age is most regrettable."

Julius Rosenwald, chairman of the board of directors of Sears, Roebuck and Company: "For many years Mr. Armour was a leader of Chicago's greatest industry. He was a patient and kindly man who was loved by all who knew him."

Oscar Mayer, Sr.: "I worked for the Armours in 1881 when Mr. Armour stepped into his father's business—a keen, upright young man who was not afraid to work. I came to regard him as one of the finest business men in the world, never too busy to be kind to his employees. I regret deeply to hear of his passing."

Col. John Roberts, president of Miller and Hart Packing Company: "With the passing of Mr. Armour, the industry lost an outstanding figure. He was a great philanthropist and in addition to having certain well known characteristics he had the same pleasant personality of his father, carrying out the latter's ideas. Having been an intimate and life-long friend, I feel his loss greatly."

Mr. Armour's body was brought back from London on the *Berengaria* and was accompanied by Mrs. Armour and her daughter and son-in-law, Mr. and Mrs. John J. Mitchell, Jr. The funeral was held Tuesday, August 30, at the Fourth Presbyterian Church, Chicago. Burial was in Graceland cemetery. Armour and Company offices and plants throughout the world closed the afternoon of the funeral. Mr. Armour is survived by his widow and his only child, Lolita, now Mrs. Mitchell. Philip D. Armour III and Lester Armour, vice-presidents of Armour and Company, and trustees of Armour Institute, were nephews of Mr. Armour.

Active pallbearers were: Lester Armour, Laurance H. Armour, Philip Armour, A. Watson Armour, Herman Armour Nichols, and P. A. Valentine, Jr.

HEAT TRANSMISSION TESTS OF WALLS

(Continued from page 9)

be 3 to 6 times as great with a 4 in. layer of Thermofill as without it.

Following is a brief summary of the conclusions drawn from the results of this investigation:

1. Calculated heat transmission coefficients of wall constructions are not reliable.

2. Heat flow increases as the temperature drop through the wall increases, this effect being more pronounced in the case of hollow walls.

3. Substantially the same results are obtained, whether little or much of the heat reaches the wall in the form of radiant energy.

4. Filling a hollow wall with the proper kind of insulating material decreases the heat transmitted very markedly.



Waste Dethroned!

Waste no longer reigns in Industry! Timken Bearings have decreed it! Machinery users are freed of the excessive tax of friction, wear, inaccuracy and under-production.

Power savings as high as 60% and lubrication savings of even greater proportion stand to the credit of Timken Tapered Roller Bearings.

On high speed work Timken Tapered Roller Bearings are being specified for operation at 15,000 r. p. m. On heavy duty jobs Timkens are carrying single loads upwards of 2,500,000 pounds.

On the spindles of the finest machine tools Timkens are

making extreme precision a permanent quality. In electric motors Timkens are revealing hitherto unheard of saving and endurance.

In every type of equipment the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made electric steel has brought a new era of economy, precision and endurance.

So great are Timken betterments that it is advantageous in many cases to replace obsolescent types of equipment *at once*. Leading manufacturers in every line now offer Timken-equipped machinery.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS

Please mention *The Armour Engineer*

DECISIONS

(Continued from page 14)

wish to achieve true success. I do not ask you to compromise your beliefs—as a matter of fact, I would have you fortify and strengthen them, which can be done most surely by confessing, first of all to yourselves, errors when you have committed them. This applies as well to those intimate and inward personal things which apparently only relate to you. By such a confession and by such an insistence that you will not excuse your own wrong doings you will prevent yourselves from being confirmed in evil. Do not attempt to hide things, especially from yourself. Others may excuse you but do not attempt to excuse yourself. I have seen many men whose future has been wrecked by a lack of candor—an unwillingness to admit mistakes.

In this life a certain amount of pride is essential to real manhood. The question is, of what are we most justified in being proud. I cannot help but think that while it is very proper for us to accept the good things of life that come to us without effort on our part, pride in those things is not a measure of manhood. On the other hand, those things which come to us to a large extent due to our own individual activities through the exercise of our power of decision are things for which we are reasonably justified in having pride. We cannot select our ancestors, and to a certain extent we cannot select our descendants; but, at least, to refer to our descendants, we have some power in training them to determine what they shall be.

Outside of our bodily descendants we have descendants in the form of work that we do and the character which that work exhibits. We are proud of our children in this sense—whether they are the products of our hands or our minds—and they bear a certain mute testimony of regard for us. It is natural, praiseworthy, and altogether to be esteemed that we should be proud of the things that we accomplish, and there is no more God-forsaken man in the world than the man who has no pride in accomplishment. Emerson says that if you make a mouse trap better than anyone else can make it, the whole world will beat a path to your door. If you can have no pride in accomplishment, the only thing for you to do is to follow Ibsen's suggestion and to buy yourself a dog, for a dog will be faithful even to a faithless master.

I presume each of you thinks that you have selected your vocations and that these vocations will follow the

lines of your special studies, which include the several branches of engineering. The particular employment that you will seek, however, is another matter and I am very much afraid that some of you will be of necessity diverted from the lines of your special training due to the difficulty that you will find in obtaining employment in precisely those lines.

I wish that I could give you a sure key to proper employment. It is something like the philosopher's stone—it apparently does not exist.

Far more important, however, than the particular thing that you do is the necessity of seeking employment with a desirable employer—one that you can be proud to work for, whether it be a corporation or a person. Corporations have been supposed in the past to be without souls. I think that this is untrue and that there are many corporations where what we call a soul is found in a large degree. These are corporations that really try to render public service and are not being used merely as the football of speculation. They value their reputations and good will in some cases far beyond what it is possible for an individual to do. They are unwilling to sacrifice their standing for immediate advantage. Whether it be an individual or a corporation, therefore, seek employment with those of whom you can be proud in your association.

I can think of no more fitting closing than to urge you in your decisions to realize, above all things, that you are human beings and that insofar as human thought can go we can find no better justification of human existence than in social relationship. Develop, therefore, your social relationships to the highest degree. Make friends. Do this systematically and effectively. Keep in touch with them. Think of how you can render them small services—not with the thought of charity but with the idea of tying them closer to you. It would be a crime if I put this on a utilitarian basis and should suggest that your friends would be useful to you and that, therefore, you should cultivate them. Nevertheless, while friendship is its own and enduring reward we should never reject the help of a friendly hand.

In the beginning, I said you were going out into the world and that you were to become a part of the world. I presume that this has been true more or less every moment since you were born; and I urge you that it shall be true every moment from now on and I urge you to realize that the best part of the world that you should be going out into and becoming a part of is the great ocean of humanity of which

each of you, as it were, is but a single wave.

It is here that you have the greatest field in which you can exercise your

(Continued on page 36)

THE BOY SURVEYORS

(Continued from page 15)

were at fault, they consumed the pills the results did not appear as quickly as this friendly but kleptomaniacal pair would have liked, so they appropriated a cake of soap and an apple from a third tent. After this Bacchanalian orgy, Oscar and Susie were never heard from again, but it was feared and hoped by their deeply concerned friends, especially Chamison, that their toes were turned up to the daisies and that they had received their eternal reward, if any.

Hunting and fishing played a minor part in the summers of the young surveyors. Hunting wasn't allowed, and there wasn't a great deal of fishing done, although a good many fish were caught and parked in the ice house for no particular reason, since their destiny was disintegration by other means than the knife. Ed. Chum caught a lot of fine fish, one of which is especially worthy of mention. It seems Chum was trolling with a sky hook on the end of a one hundred foot steel tape which he had borrowed from the supply room during a quiet moment. It came upon him quite suddenly that he had a little nibble, but before he could make up his mind he found himself yanked over to the other side of the lake by a rather unusual force. He was a trifle surprised, but he gamely pulled in his energetic catch. He claims it was a flying fish, that it must have been a flying fish because that is the only kind of fish you can catch with a sky hook. At any rate he towed his quarry clear back to camp but unfortunately it got away just as he was ready to pull it in.

On the whole, camp was considered fairly successful although not very riotous. Everybody had one week of an intensified course in culinary engineering and usually ate too much. A handcar got loose and ran away with several gentlemen who had been nonchalantly sitting on it, stopping, curiously enough, at the exact spot the passengers had been walking toward when they stopped to rest. A few attempts were made to paint Minocqua and Sayer a brilliant red, and occasionally somebody tried to set Wisconsin on fire. But aside from these little accidents, Professor Wells found very little excuse for a demonstration of the sterner attitude which he loved to assume but which he found so difficult.



MOTION PICTURES THAT TELL THE STORY OF EXPLOSIVES

HERE are films that will take you as quickly as the magic carpet of the Arabian Nights, to many places where men are busily engaged in mining, quarrying and construction. They will put before you on the screen some of the most interesting applications of modern explosives.

The film entitled "The Explosives Engineer—Forerunner of Progress" visualizes the uses of explosives and shows such interesting views as testing explosives, an actual mine explosion with flames shooting out of the mine entrance, and measuring the velocity of exploding dynamite.

Another interesting film in two reels is called "Rubbing the New Aladdin's Lamp." The first reel "The Blasting Cap" is a fascinating story of how industry uses these little shells that contain such terrific energy. The second reel "Hercules Electric Blasting Caps" clears up the apparent mystery that has hitherto surrounded this type of detonator. In both films animated drawings enhance the interest.

The title of another film "How Jimmy Won the Ball Game" apparently has no connection with explosives. The scenario is a story of human interest, tense with excitement, and some pathos, and it carries an important safety lesson in handling and using blasting caps.

All of these films are available for free distribution, the first two in Standard (35 m. m.) and narrow (16 m. m.) widths and the third film in Standard width only. Please make booking arrangements for showing these films as far in advance as possible to avoid disappointment.

HERCULES POWDER COMPANY (INCORPORATED)

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Dynamite—Permissible Explosives—Blasting Powder—Blasting Supplies

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Please mention The Armour Engineer

SOCIETIES

(Continued from page 20)

And with Doctor Prothro directing again this year we may expect to hear a finer Glee Club than ever before. That in itself is something.

Last year there was an outgrowth from the Glee Club in the form of a quartette. It was well received upon all occasions, and preparations are under way for an even better group this year. The present line up is: Alan Tully, bass; Willys Thomas, baritone; J. T. Clark, tenor; and R. M. Spencer, tenor. Harry Krieger is the accompanist.

There is a possibility that this "four" will be heard in some good numbers with a background of *Stresses and Strains*.

Willys Thomas is manager of the club this year, and Clark Shabino is doing good work as librarian.

THE ARMOUR BAND

The Armour band, under the leadership of George Rezac, Sousa's only rival, needs more men with lusty lungs. It doesn't need more men to improve the quality, but to increase the intensity, if possible, while retaining a high standard. A band is most useful in promoting school spirit and in promoting an interest in music. Armour has had, for many years, a particularly good one. It can only continue to have such a good one if the cooperation of everyone in school is forthcoming.

The Armour band extends an invitation to capable students, and especially to freshmen, to join its ranks. All instruments are welcomed. Details will be explained by Mr. Rezac on any Monday from five to six o'clock in the Assembly Hall, which is the time and place of rehearsals.

ORCHESTRA

The orchestra this year promises as brilliant a season as it has ever enjoyed. Not only have all the former members turned out, but a fair number of new men have registered. Violins appeared in large numbers, there being seven new ones, making a total of fifteen. However, more talent is still needed; especially a cello and trombone. Anyone interested in orchestral renditions and possessing some degree of experience is eligible to membership. So, if you are thus gifted, come to our orchestra rehearsal next Tuesday.

A few vacancies occurred due to graduation, but these have all been aptly filled.

Mr. Vevurka, the conductor of last year, also graduated. Much credit is due him for the wonderful developments made during the time he was connected with the orchestra. George Minneberger has been chosen as the leader for the coming year; he has universal good will and is wished every success.

TRUSS

A banquet on September 8, 1927, at the Hotel Brevoort ushered in a year which promises to be full of activity for the members of the Truss. An extensive program for the future was planned. We hope to make the Truss of greater benefit as an instrument of fellowship both to its alumni and active members.

RIFLE CLUB

The first meeting of the Rifle Club was held Monday, October 10. Professor Mangold acted in the capacity of faculty adviser. Thirty-five members reported for the first meeting. After some discussion a committee of four, representing the freshman, sophomore, junior and senior classes, was elected

to draw up a constitution and investigate the possibilities of obtaining rifles, ammunition, etc. The members of this committee are: W. W. Kerr, senior; S. S. Pulaski, junior; S. Janiszewski, sophomore; and G. Heller, freshman.

The present range, used temporarily, is in the 124th Armour, located at Thirty-fourth Street and Wentworth Avenue. Members who have their own rifles are using the range daily.

At the next meeting an election of officers will be held and definite arrangements will be made so that it will be possible for all members to participate in the activities of the club.

The object of the club is to promote and stimulate an interest in rifle marksmanship both for educational and recreational benefits. When the club has been duly recognized, a team will be organized to participate in inter-collegiate matches.

Students interested in the club are invited to attend the next meeting.

FLASK AND BEAKER

Although Flask and Beaker is still a young organization, it has gained great impetus. It is an organization that was much needed to promote close friendship and good fellowship among the upper classes of the chemical engineers. Flask and Beaker has many plans for the coming year which will show the worthiness and importance of such a type of club.

The spring initiation banquet was held at the Fort Dearborn Hotel on June 8, 1927. The following students were welcomed to membership in Flask and Beaker: J. W. Heimaster, U. G. Naef, J. E. Candlin, Jr., M. P. Johnson, and F. O. Johnson.

ARMOUR TECH ATHLETIC ASSOCIATION

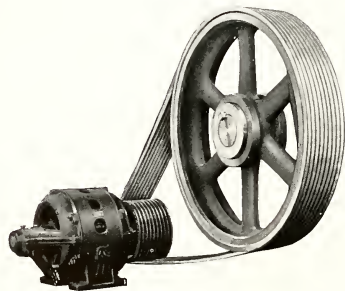
Treasurer's Report, College Year 1926-27

Receipts

Cash Balance, September, 1926.....	\$ 3,183.92
795 student fees, \$8.50 each, 1st Semester....	6,757.50
Less refunds (3 students did not attend classes)	25.50
	6,732.00
Less Class dues.....	792.00
	5,940.00
760 student fees, \$8.50 each, 2nd Semester....	6,460.00
Less refund (1 student did not attend classes) ..	8.50
	6,451.50
Less Class dues.....	759.00
	5,692.50
Interest on bank balance.....	199.98
	\$15,016.40

Disbursements

Armour Engineer	\$2,576.47
Advertisements and Subscriptions.....	1,186.68
	1,389.79
"A" Blankets	372.03
Baseball	41.98
Basketball	328.64
Boxing and Wrestling	65.51
Cycle	3,567.82
Advertisements, sale of books, class and other donations.....	1,743.00
	1,824.82
Directors and Coaches	4,535.50
General Expense	238.55
Golf	391.01
Medical Expense	595.68
Musical Clubs	614.34
Swimming	38.55
Tennis	449.53
Track	576.68
	11,462.01
Cash Balance	4,749.10
Less Class Balances	1,195.31
	3,553.79
	\$15,016.40



EFFICIENCY

Texrope Drives are very largely specified without any question as to mechanical efficiency. Some one of their other very marked advantages may be of more importance, and Texrope Drives would be used even if their efficiency were only fair.

But wherever it has been possible to make comparisons, Texrope Drives have shown large power savings, often enough to pay for the equipment in a short time.

Field and laboratory results both show that transmission of power is accomplished by the Texrope Drive with the absolute minimum of loss.

Efficiency 98.9% by actual test.
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Each of the 17 degrees are uniform with every pencil of that degree—always.

The wood is specially selected cedar, of the best quality obtainable.

Their perfection makes them economical as they can be used down to the last inch.

The distinctive watermark finish avoids substitution—known and recognized throughout the world.

UNIQUE THIN LEAD COLORED PENCILS

Make fine lines for figuring, checking, sketching, blueprints, etc.

Blue	Purple	Pink
Red	Brown	Lt. Blue
Green	Orange	Lt. Green
White	Yellow	Maroon

\$1.00 per doz.

17 Black Degrees
3 Copying

For bold heavy lines 6B-5B-4B-3B

For writing, sketching 2B-B-BB-F-H

For clean line lines 2H-3H-4H-5H-6H

For delicate, thin lines 7H-8H-9H

Plain Ends—per doz. \$1.00

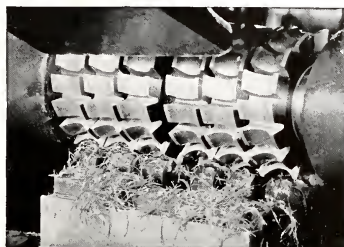
Rubber "—per doz. \$1.20

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Manufacturers are learning that Brown & Sharpe Formed Cutters, in addition to giving a substantial increase in production, are lower in cost because of their ability to stand up longer between sharpenings.

Above, a gang of six Brown & Sharpe Formed Cutters is in use for a form milling operation on wrench handles. The cut was taken rapidly yet leaving the good finish which was required.

It will profit you to become thoroughly familiar with the line of over 1500 styles and sizes of Brown & Sharpe Cutters. Send for a copy of Small Tool Catalog No. 30, which lists them all and contains considerable information about cutters.

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They have rendered satisfactory service in industrial plants, railroad buildings, piers, warehouses, etc., throughout the country and in foreign lands since 1876.

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All gears are protected against exposure to elements. The slots are interlocking and in case of damage, new ones can easily be inserted. Operated by hand, gearing or motor.

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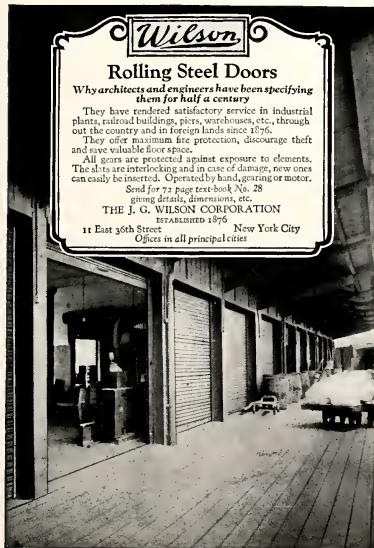
giving details, dimensions, etc.

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HUNTERS IN THE DARK

By A. SCHAEFFER, Jr.

National Tuberculosis Association

ONE of the least known efforts of the National Tuberculosis Association is the systematic research carried on under its supervision. To the man in the street the tubercle bacillus may be only "a bug in the lungs," but to the highly trained specialists who are making tuberculosis research their life work, it is one of the most baffling problems of medicine.

Since the discovery of the tubercle bacillus by Koch, forty-five years ago, research workers had gone ahead independently, each blazing his own trail. A number of years ago, however, a plan of co-operative research was begun by the National Tuberculosis Association for new and more exact knowledge, on the basis of certain physical structures which compose the tubercle in the animal body. These structures are the tubercle bacillus, the epithelioid cell, the lymphocytes, certain colloid substances and the flowing blood and lymph compounds which come in contact with the tubercle structure.

The chemical procedure for analyzing the bacillus is performed in nineteen different steps, so far. At the last annual meeting of the National Tuberculosis Association in Indianapolis in May, the research committee exhibited fifteen vials and bottles containing waxes, fats, sugars, and proteins, which already have been isolated in the

laboratory as distinct substances, many of them new to scientific knowledge. This is a decided step forward toward the solution of the problem. The substances range from a dirty, black, treacle-looking mass to white, shiny crystals, and were separated by specialists in the field of chemistry, physics, biology and physiology.

What they will discover in the future cannot be predicted, for they are as gropers in the dark, seeking the pathway to the light of knowledge. Eventually the various bits of information will be gathered together, and on the basis of the whole there is little question but that a cure for tuberculosis will be discovered—the result of team work.

That others besides specialists in research are keenly interested in the problem is best illustrated by the fact that two large chemical manufacturers are greatly assisting the research work by providing millions of tubercle bacilli bred on a carefully composed chemical medium. Last year, as only part of their contribution to this organized effort to discover a cure, one house had 2,000 bottles of tubercle bacilli growing at one time. The product of these cultures gave a mass of moist bacilli about as large as an American cheese, yet it served only to begin the study of the fat substances

(Continued on page 36)



CHARLES W. HILLS

CHARLES W. HILLS, Jr.

CHARLES W. HILLS

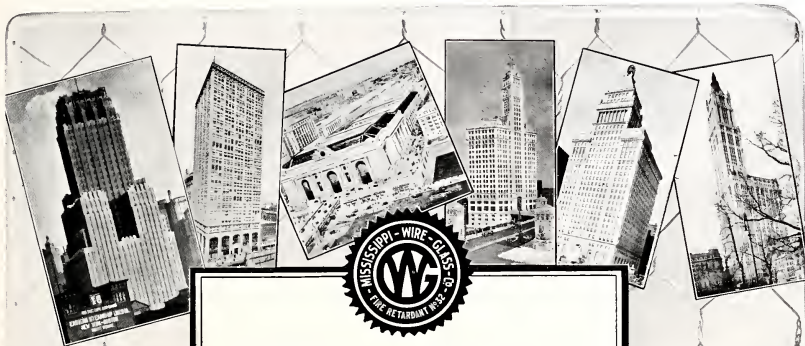
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DECISIONS

(Continued from page 30)

power of decision. It is here that your ingenuity, your imagination and your tact can have their fullest play. It is here that your efforts in the moulding of human beings to useful ends may be accomplished. All your engineering ability is after all available only in the service of man, and to bring that service to its fullest completion, you must study and make man appreciate the usefulness of whatever of a material character you may accomplish. There is joy in this work; there is the reward of praise and sympathy. However your efforts may be directed, therefore, never forget that the success of those efforts depends upon their usefulness and their usefulness depends upon their appreciation by the possible user. Here you have an unlimited field—a field that stretches far beyond the powers of fancy. Therefore, first and last, be men and exercise your powers of decision upon and among men who are the final judges of your merits.

HUNTERS IN THE DARK

(Continued from page 34)

in this organism.

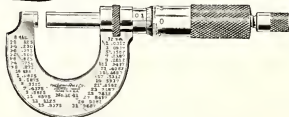
Until a specific cure or medical aid is discovered for the eradication of tuberculosis, the National Tuberculosis Association reports that the only treatment that has so far been found to be effective is the combination of absolute rest, good food, sunshine and fresh air under the direction of a physician who understands tuberculosis.

Any information which the National Tuberculosis Association or its 1500 affiliated state and local organizations possess in regard to tuberculosis is available to anyone on request. Their entire work is supported by the annual sale of Christmas seals.



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Back of this picture is another—a score of huge packing plants strategically placed to best serve consumers of meat and producers of livestock—500 branch houses bringing daily supplies close to daily markets—1500 refrigerator cars leaving these eighteen plants for these 500 branch houses every day—60,000 employees upholding the Armour standard—“Armour on a food product is an assurance of quality”—Thousands of farmers and ranchers producing annually fifteen million head of livestock which Armour and Company turn into food—and for which they pay the raisers hundreds of millions of dollars on delivery. And back of this, another picture—the Armour Kitchen in Chicago—the point of contact between you and your home, the ranchers and farmers, the buyers, dressers and processors of meat.

Here under the direction of domestic science experts is determined for Armour what you and your folks demand. From here is enforced every step in preparation that must be observed so that every Star Ham is a delight when it reaches your table.

For sixty years Armour and Company have been perfecting methods to safeguard the meat supply of the nation. Star Ham is but one of the quality products that has established Armour and Company's reputation among the world's leading provisions.

A R M O U R A N D C O M P A N Y · C H I C A G O

ATHLETICS

(Continued from page 23)

CROSS-COUNTRY

The cross-country team has been practicing daily under the direction of two veteran members. The team was rather shaken up when Payne returned on crutches and Finlayson did not return at all leaving only Deiwert and Smith to carry on this fall. However the sophomore-freshman meet uncovered some rather good men who have been working right along. Several meets have been arranged, most of them away from school. The team will be without a regular coach till Loney Stagg finishes the football season. In the meantime Payne, who has been captain for the last two years, will fill in as substitute.

BOXING AND WRESTLING

Coach Joe Smith will meet all seekers after fame on the mat and with the leather gloves on Monday, Wednesday and Thursday in the gym. We expect a fine team in both events as quite a number of men have reported for practice. Poupitch will lead the boxers but the captain of the wrestling team has not returned to school. Walt Healy, the boxing captain of last year, is managing both teams this year and has promised meets enough to keep the men busy. It is hoped that more men will turn out for these teams, for we know we have a great deal of good material if it will only present itself.

ENGINEERING NEWS

(Continued from page 25)

it is not desired that the intensity be gradually increased this can best be done as follows: With the right hand master switch off, all the switches of the third row are closed. Upon closing the master switch the fountain will become a blaze of red. If only the isolated jets are to be illuminated, only the corresponding unit and master switches are closed. Instead of an instantaneous application, however, it is often desired to have a gradual increase in the intensity of illumination. The closing of the first row of switches, either individually or by master control, starts the dimmer bank in operation. If these switches are kept closed longer than one minute and one-half a second cycle will be repeated. If they are opened before the first cycle is completed the lamps will be completely darkened at the end of the first cycle. If it is desired to maintain the color red with 50 per cent voltage applied to the lamps, the second row of switches is closed. Opening them again permits the cycle to be completed.

Thus the valves and switches become a veritable keyboard controlling a great chromatic organ upon which symphonies in color and sparkling water may be composed. Here is an opportunity for some artistic temperament to write a *Fountain Symphony*, or a cantata on *The Flashing Waters*, not in musical notes, of course, but in symbols adaptable to the keyboard of switches.

And when, next spring, the fountain awakens from a winter's hibernation, it may have an added appeal to the reader, who views it in all its blaze of colored glory, as an aesthetic achievement of engineering.

FRATERNITIES

(Continued from page 22)

With the return of all but one of our members, we are ready for one of the most vigorous and eventful years of our history. The annual convention is to be held in Chicago in 1928 and Beta chapter is to play the part of host. This gives us a feeling of pride and a determination that the delegates and visitors will long remember the event.

Several smokers have been held thus far with great success. The big event of the fall season, however, was the Halloween party. Preparations had been under way for so long that it could be nothing but a success.

Beta Psi wishes to announce the pledging of the following men: M. C. Berg, L. L. Larson, and F. W. Spalding.

KAPPA DELTA TAU

Kappa Delta Tau has started the school year with a lively spirit which we expect to retain throughout the entire season. On Halloween night a sinister and spooky initiation was held, which the members attended to a man. After the initiation a smoker was held in honor of our new member, George Heller.

One week later the most successful dinner dance of the fraternity's entire career was held at the Deauville Cafe at which the following new pledges were welcomed to our midst: Isadore Leschinsky, Samuel Sorkin, and A. Spiercer.

WIRE

automobile and airplane wires, electrical wires, submarine cables, bridge-building cables, wire rope, telegraph and telephone wire, radio wire, round wire, flat wire,

star-shaped and all different kinds of shapes of wire, sheet wire, piano wire, pipe organ wire, wire hoops, barbed wire, woven wire fences, wire gates, wire fence posts, trolley wire and rail bonds, poultry netting, wire springs, concrete reinforcing wire mesh, nails, staples, tacks, spikes, bale ties, steel wire strips, wire-rope aerial tramways. Illustrated story of how steel and wire is made, also illustrated books describing uses of all the above wires sent free.

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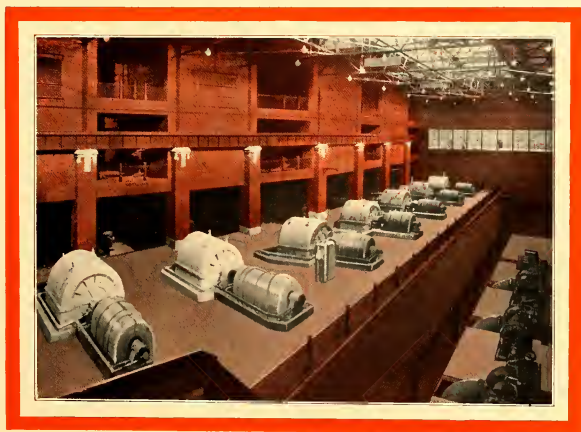
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The **ARMOUR ENGINEER**

VOL. XIX

JANUARY, 1928

NO. 2



Pump and Blower Room, North Side Sewage Treatment Works, Chicago

*Published Quarterly by the College of Engineering
Armour Institute of Technology
Chicago, Ill.*

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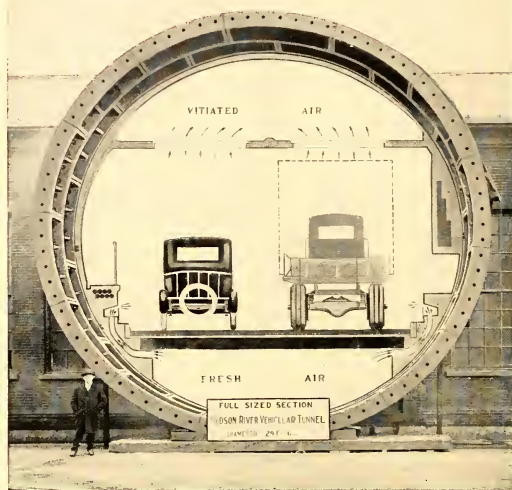
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YOUNGER COLLEGE MEN ON RECENT WESTINGHOUSE JOBS

The Holland Tunnel

Where do young college men get in a large industrial organization? Have they opportunity to exercise creative talent? Is individual work recognized?

THE HOLLAND TUNNEL is one of engineering's greatest triumphs, because—

- it is twice the size of any tunnel ever bored beneath the bed of the Hudson River.
- it is over a mile and a half long.
- it is designed for automobiles to use.

Because they generate poisonous car-

bon monoxide gas, motor cars create an entirely new need for tunnel ventilation. Yet even when the Holland Tunnel is filled to capacity and 2000 motor cars are passing through it in each direction, the air is fresh and pure.

This is a type of engineering undertaking with which young men in an organization of the size of Westinghouse frequently

are brought into intimate contact. Opportunities to work on the stupendous, the never-before-undertaken, are not rare here. Hence young men of capacity, of enterprise, of genius, find much to challenge their imaginations and abilities.

A battery of 56 fans driven by Westinghouse motors pump fresh air into, and foul air out of, the Holland Tunnel. Twenty-eight more Westinghouse-motored fans are a reserve. Westinghouse planned the lighting system in the tunnel; also the system of remote control.

Westinghouse



THE ARMOUR ENGINEER

Published Quarterly by the College of Engineering

ARMOUR INSTITUTE OF TECHNOLOGY

Volume XIX

January, 1928

No. 2

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Pharaoh Wrote Few Letters



POST OFFICE, CAIRO, EGYPT

Now during the tourist season, the mails out of Cairo are tremendously heavy. And no wonder! Everyone who travels in Egypt, who comes into contact with the most ancient of civilizations, must say something about his impressions to someone—even if he has hitherto been a lazy correspondent. He may send only a postal card showing the Great Pyramid with “X showing the spot where I ate my luncheon.” But he must write something!

And since the discovery of the tomb of Tutankhamen, tourists have multiplied, impressions have been voluminous, and the mails have increased enormously. “Of course, you can’t imagine it without being here, but I simply must tell you about....” And so on.

It is very lucky for the correspondents that with her wonders of antiquity, Egypt did not also inherit the ancient postal system. Only the Pharaohs and the great

officers of state could indulge in the luxury of corresponding with a foreign country—and a letter from the King of Egypt to the King of Babylon might take months in transit. Some of these royal letters have come down to us. They are very long, full of elaborate salutations and important news—as if their writers considered their composition the event of a season.

All things considered, we may be grateful that the modern postal system of Egypt is what it is—efficient, orderly, up-to-date. Of course, the Cairo Post Office is equipped with Otis Elevators.

So with the advance of civilization, Otis, the symbol of twentieth century convenience, has been put at the service of the Pharaohs of Egypt in spreading their fame far beyond any worlds which they could even have dreamed of! The pyramid builders would, we feel sure, appreciate the marvel.

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The ARMOUR ENGINEER

Volume XIX

January, 1928

Number 2

WORDS—WORDS—WORDS

By WALTER HENDRICKS

Associate Professor of English

"WHAT do you read, my lord?" asks Polonius. And I answer for Hamlet, "Words, words, words." for I have here before me, over a half million of them, in freshman semester theses.

And as I read on and on and on, I begin to wonder about those words. I say to myself: they are symbols. And they were invented for the purpose of transferring ideas, and not with any intention of concealing.

And then I begin to wonder if the student understands. Does he know that words, like stars, differ in intensity. Does he realize that there are words and worlds in progress of formation, that there are worn-out words and worlds as well; that there are stellanovae, brilliant stars that flash suddenly into view; that there are groups of synonyms like star clusters; that there are those ephemerae, signs of the times, or of the day, birds of passage, meteors, meteorites, or perhaps comets with their charted orbits. Or are words merely words, stars merely stars.

Coming closer to earth with my figures, I wonder does he realize that words are like tools, and that there are many kinds. Or are they all simply hammer and saw. Does he not know there are many kinds of hammers even. And what would he say if he saw a brawny blacksmith with a tack hammer in his hand? And what

THERE is an ancient legend which tells us that when a man first achieved a most notable deed he wished to explain to his tribe what he had done. As soon as he began to speak, however, he was smitten with dumbness, he lacked words, and sat down. Then there arose—according to the story—a masterless man, one who had taken no part in the action of his fellow, who had no special virtues, but afflicted—that is the phrase—with the magic of the necessary words. He saw, he told, he described the merits of the notable deed in such a fashion, we are assured, that the words "became alive and wolked up and down in the hearts of all his hearers." Thereupon, the tribe seeing that the words were certainly alive, and fearing lest the man with the words would hand down untrue tales about them to their children, they took and killed him. But later they saw that the magic was in the words, not in the man.

—Kipling.

would he do if he had to rip a sixteen foot pine board or cut a scroll with a cross-cut saw? And if he had a pipe to turn? Would he go through the motions with a bicycle wrench, or,

say, with a set wrench? Does he know that there are wrenches with teeth in them to do just that kind of job, that grab and grip like the jaws of a bulldog, and will not let go without leaving their mark! Or is he willing to sit in a damp corner of a dark cellar and go through the motions!

Yes, and sometimes we use the wrong tools altogether, an awl for a hammer, a saw for a wrench. We commence to handle these tools in childhood, but we never learn to use them well. We are satisfied with half jobs, with the work of a wood-butcher. We are not artists. We do not want to be. We say *he don't* and *between you and I* through a lifetime and despite a college education. We are satisfied to call any kind of a digging tool a shovel. And not always through not knowing a spade, but all too frequently from carelessness.

I must change my figures again, a last time. Words are like English sparrows, that is, most words, or most of the words we use. But does he know that there are wild words like wild birds, words that seek the solitudes like the hermit thrush, gay birds like the red-breast, saucy birds like the jay, acrobatic birds that walk head first down the trunk of a tree like the nuthatch?

Now, in conversation, those birds are hard to capture; but in composition, one can have always near a shaker of salt.

MODERN USES

By F. A. MANSKE, '23

Field Research Engineer, United States
Gypsum Company



Poured gypsum concrete. Poured gypsum can be placed in freezing weather for, in the mixing and working, heat is given off.

GYPSUM is a form of natural rock, white or gray in color, and is either mined or quarried. Chemically, it is calcium sulphate in chemical combination with about 21 per cent of water of crystallization (CaSO_4 plus $2\text{H}_2\text{O}$). In the process of manufacturing, the gypsum rock is crushed, dried, and then ground to a fine powder. The powdered gypsum rock is then heated by standard methods, until the necessary quantity of water of crystallization is driven off in the form of steam. The liberation of the water of crystallization is termed calcination, and the resultant product is commercially known as calcined gypsum (CaSO_4 plus $\frac{1}{2}\text{H}_2\text{O}$). When calcined gypsum is mixed with water, the quantity of water that was driven off during the manufacture, again enters into combination with it, producing a structural material which chemically and physically corresponds to the natural rock.

Gypsum has been used in the United States for more than a century. The total production of crude gypsum mined in 1880 amounted to 90,000 tons, while in 1925 there were over 5,500,000 tons mined. There are at present sixty-two active plants mining and manufacturing gypsum products. Geographically it is very widely distributed. New York state is the largest producer, with Iowa second, Michigan third, Ohio fourth, and Texas fifth. The five largest gypsum producing countries today in their order of production are; the United States, France, Canada, United Kingdom, and Germany.

Calcined gypsum is the basis for many building materials including wall plasters, gypsum lath, wallboard, gypsum sheathing, partition and furring tile, and beam and column coverings. Extra dense calcined gypsum

of calcined gypsum compounded with other materials to produce a product of cellular nature. For industrial purposes, gypsum is used for all types of moulding work, fillers in various materials, and for many chemical purposes. Gypsum is also used for agricultural purposes. Today practically

is used for roof, floor, and building tile, and for poured in place construction. Insulation materials are made

three parts of sand are used with one part of gypsum by weight. This is mixed with water, and the plastic mix applied $\frac{1}{2}$ -in. to $\frac{3}{4}$ -in. thick over gypsum, wood, or metal lath. Gypsum wall plasters adhere to any of the approved plastering surfaces, having the greatest bond over gypsum lath. The following kinds of gypsum plasters are manufactured: fibred or unfibred cement plaster for use with sand, wood fibre plaster used without sand, prepared sanded plaster,

Bondercrete for concrete surfaces, gauging plaster used with lime putty for white coat work, prepared finishing plasters, Keenes cement for hard finishes and imitation marble work, and moulding plasters for plaster work and industrial purposes.

A new plaster for solving acoustical problems has recently been developed by Doctor Paul E. Sabine of the Riverbank Laboratories at Geneva, Illinois, working with the Research Division of the United States Gypsum Company. This product is known as Sabinite Acoustical plaster. Early work on sound control considered properly shaped contours, curved walls and ceilings, and sounding boards. It was found later that the real difficulty was too much sound, rather than too little, and that provision was needed for absorption



Load bearing tile. These tile have a crushing strength of 1000 lbs. per sq. in. over the gross area.

every lumber and building material dealer in this country sells gypsum products.

The art of plastering goes back to the Egyptians, four thousand years ago, where calcined gypsum plaster was used within the pyramids. Some of this work is hard and durable today. Lime, too, was used in the early days, and with gypsum shares the distinction of being the earliest cementing material. Today of the plaster materials used, gypsum represents 60%, lime 30%, Portland cement $7\frac{1}{2}\%$, and magnesite $2\frac{1}{2}\%$ of the total. The use of gypsum for plastering has increased because of its quick and easily controlled set, early strength, and fireproof qualities. In the manufacture of various wall plasters, calcined gypsum is factory mixed with the proper amount of retarder to give the desired set, and hair or sisal fibre is added for binding properties. In most plastering work, two to



Applying gypsum sheathing. Strength, resistance to fire and weather, and economy are its good qualities.

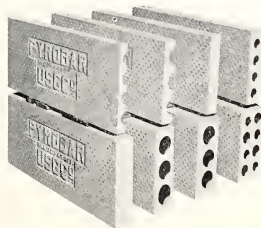
OF GYPSUM

*Illustrations Furnished Through Courtesy
of the United States Gypsum
Company*

rather than reflection. In rooms lacking good acoustics, difficulty in hearing and understanding speech arises more from the confusion of sound than from the lack of sound intensity. The problem then is one of preventing reverberation or prolongation of sound. Ordinary plastered walls and ceilings reflect about 90 per cent of the sound reaching them, and the reverberation of a single sound lasts several seconds, producing a very disturbing condition. This new acoustical plaster is made of gypsum as the cementitious material with other ingredients added which give it an open porous surface when applied to the wall. It absorbs from 15 to 20 per cent of the sound that strikes it, depending upon the pitch, as compared with 2 per cent absorption of the ordinary plastered wall. Thus, excessive reverberation and the resultant confusion of sound is reduced. An interesting application of rare architectural value is the ceiling of the new Chicago Stock Exchange. Here a special casting acoustical plaster was manufactured so moulds could be pre-cast and set into place. These are of different designs which fit into the general architectural beauty of the room.

A good job of plastering depends not only upon the quality of the plaster but also upon the kind of backing or lath used. Accordingly, manufacturers of gypsum products years ago developed a lath of gypsum which provides greater strength and in-

creased adhesion of plaster. This lath does not swell, warp, or buckle; is easily cut and applied; and is fireproof and of a good insulating value. This lath is made by moulding a plastic gypsum mix containing a small percentage of cut wood fibre or sawdust between two sheets of tough paper. The outside edges of the paper are turned in, making a



Partition and furring tile are made of a plastic calcined gypsum base containing a small amount of wood fibre.

square folded reinforced edge. These boards $\frac{1}{4}$ and $\frac{3}{8}$ -in. thick are cut to sizes 32x48 in., 16x32 in. and 16x48 in. and are kiln dried in a continuous dryer. The 16-in. width material is bundled for convenience in handling. In applying gypsum lath, the boards are nailed horizontally across the studs, breaking joints. The smooth uniform surface of the board affords a perfect bond for plas-



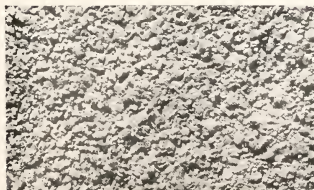
Expanded gypsum floor fill is used to improve heat insulation and fire resistance. A gypsum tile partition is seen in the background.

ter. Tests made by the Bureau of Standards show gypsum lath with gypsum plaster has an adhesion of 6 lbs. per square inch or a factor of safety of 144, which was rated first among the various types of lathing materials tested. Strength tests made by Professor P. C. Huntley of Armour Institute of Technology upon Rocklath (A gypsum lath) and gypsum plaster as compared to other lathing materials when applied to wood base construction showed the following: First—ordinary frame construction covered with Rocklath and plaster is stronger than other types of lath and plaster and will resist a greater load; second—there is practically no deflection or distortion to frames covered with Rocklath and plaster whereas frames covered with other types of lath and plaster are badly distorted, particularly when wood lath and plaster is used; third—a Rocklath and plaster wall is considerably superior to other types of lath and plaster in resistance to blows or impacts.

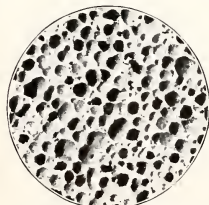
A wallboard material of gypsum giving a finished wall, taking the place of both lath and plaster was developed extensively during the war. Boards were made $\frac{3}{8}$ -in. thick, 32 and 48 in. wide, and in lengths from 6 to 10 ft. These are nailed parallel



Gypsum boards are moulded between sheets of tough paper, the edges being turned in to form a square edge.



Acoustical plaster with its open porous surface, absorbs from 15 to 20 per cent of the sound that strikes it. This eliminates reverberation and confusion of sound.



A view of the surface of expanded gypsum. The porous structure results in light weight.

to the studs and joists. The joinings between the board are laced by reinforcing them with a specially woven fabric embedded in a special

long and 32 inches wide, $\frac{1}{2}$ -inch thick, and applied horizontally across the studs. The gypsum core is protected by a tough paper especially

treated to make it water resistant. The long edges are formed so the boards interlock when nailed to the studding. Thus the boards fit snug and tight, decreasing the air infiltration, and providing a good insulator against heat and cold.

According to the figures of the National Board of Fire Underwriters, 618 homes burn in the United States every day, or one every three minutes. Tests made Testing Laboratory University on test tongue and groove

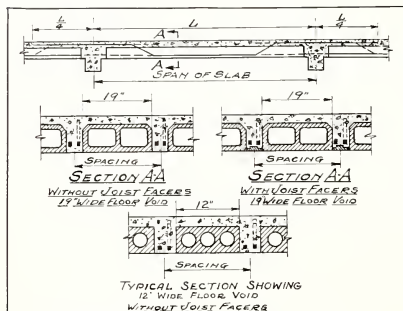
frames sheathed with Gyplap, whereas frames covered with lumber became badly distorted, particularly when the lumber was applied horizontally. Professor L. Davies of Armour Institute of Technology found in an air infiltration test that a cane fibre board permitted twenty times the air leakage than Gyplap did in a twenty mile wind.

Other moulded products made of gypsum are the partition and furring tile used in fireproof construction. These tile are made of a plastic calcined gypsum base containing a small percentage of special cut wood fibre by a continuous automatic machined process and kiln dried. The tile are 12 in. high, 30 in. long and are made in thicknesses from $1\frac{1}{2}$ to 6 in. Gypsum tile are approved by the Underwriters Laboratories and most city building codes for the following classes of fireproof construction:

1—Non-bearing corridor walls, partitions, wall furring, false columns and pilasters.

2—Unplastered partitions and corridors in merchandise storing ware-

(Continued on page 68)

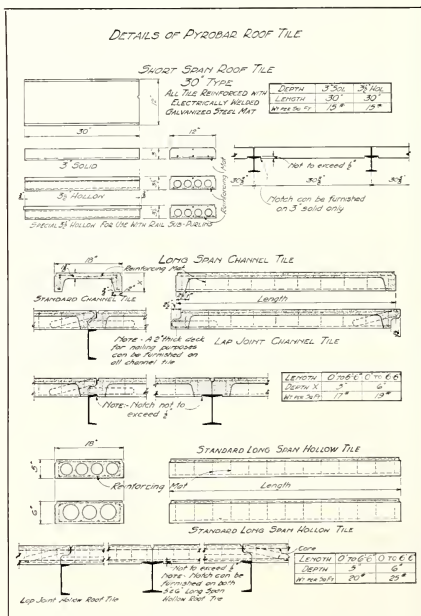


Floor voids. These tile provide a uniform plastering base, a good sound and heat insulation, and an effective fire stop.

joint cement. This provides a smooth uniform surface ready for any type of decoration. Gypsum wallboard will not warp, shrink or crack because gypsum is not affected by climatic conditions as are other kinds of wallboards. The Underwriters Laboratories have tested and approved certain brands of gypsum wallboards for strength and fire resistance, and have included them on their list of inspected mechanical appliances. Because gypsum wallboard possesses so many high grade practical features, it has a wide field of usefulness for all wall and ceiling purposes in new and remodeling work. There were approximately 600,000,000 square feet of gypsum wallboard sold in the United States during 1926. Gypsum wallboards can be specially treated for various materials, such as the manufacture of artificial blackboards.

Sheathing is the material that is applied to the studdings of a house directly beneath the exterior finish. Its purpose is to provide protection against the elements. Building practice years ago gave very little attention to sheathing materials and very often wood strips and building paper were considered sufficient. Modern design and construction now take into consideration such qualities as strength, resistance to fire and weather, and economy. One of the latest developments in gypsum board products is a gypsum sheathing material known to the building trade as Gyplap. It is used on any frame construction under brick or masonry veneer, stucco, siding, clapboard or shingles. It is made in boards 8 feet

at the Greenpoint of the Columbia panels of $\frac{7}{8}$ -in. North Carolina pine sheathing nailed diagonally to the studs and covered with building paper and cedar drop siding, and Gyplap nailed to the studs covered with drop siding, showed Gyplap 200 per cent better than the all wood panel. The gypsum sheathing permitted no fire to reach the studs for 30 minutes. A strength test made at Armour Institute of Technology shows that ordinary frame construction sheathed with Gyplap is much stronger and resists a greater load than frames sheathed in the customary way with lumber. The test further showed no deflection or distortion in the



Roof tile. Gypsum has a density of 75 lbs. per cu. ft. compared to 145 lbs. for concrete.

THE NORTH SIDE SEWAGE TREATMENT PLANT

The World's Largest Activated Sludge Sewage Treatment Plant

By H. E. LARSON, '28

Student in the Department of Electrical Engineering

THE simplest and most common method of sewage disposal is by dilution of the sewage with large quantities of water containing living organisms, such as bacteria, which are always present in rivers and lakes. The unstable sewage matter, which serves as food for the bacteria, is thus converted into cells of living organisms, most of which require oxygen for the process.

This process, in which the sewage organic matter is reduced to mineral ash and inorganic gases, is not attended by foul odors, and the sewage loses its polluting properties.

The large quantity of dilution water necessary for the treatment and disposal of Chicago's sewage has come from Lake Michigan, and has been led, together with the sewage, through the channels of the Sanitary District to the Mississippi River by way of the Des Plaines-Illinois River, treatment and purification taking place en route. The drawing of so much water from Lake Michigan has lowered, somewhat, the level of the Great Lakes System, and at the present time the Sanitary District of Chicago is engaged in a controversy over lake levels. Private power interests at Niagara Falls, eager to use every possible drop for power, are bitterly opposed to this discharge of Lake Michigan into the Mississippi River, so necessary to the health and public welfare of the middle west. As a result, the draw on Lake Michigan for sanitation purposes has been limited to 8,500 cubic feet per second by the latest permit from the Secretary of War, which was given on March 3, 1925, for a period of five years.

The population of that area known as the Sanitary District is increasing at the rate of 71,000 per year, and increasing with it is the sewage disposal problem. With the supply of dilution water limited and an increasing amount of sewage to be treated and disposed of, it is immediately appar-

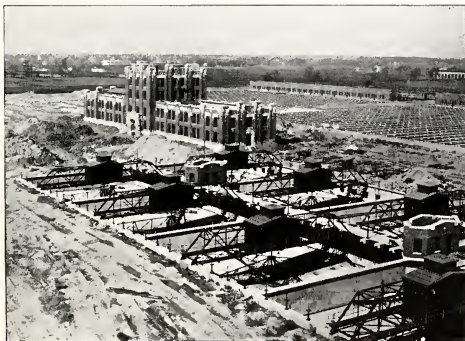
ent that the present system of canals and channels of the dilution system becomes dangerously inadequate. Complaints and suits from the towns along the Drainage Canal and the Des Plaines-Illinois River are inevitable and have been registered. The distance required for a concentrated solution of sewage to become purified by the natural process is, of course,

The solution to this problem is more gigantic than it is complex. Vast sums will be needed to construct sewage treatment plants that will bring about the necessary biological processes without added dilution water. In fact, the Sanitary District has already outlined and begun a program of construction of sewers and treatment plants that will call for over \$150,000,000, consuming the entire resources of the District for over 20 years.

The North Side Sewage Treatment Plant, located at Howard Street and McCormick Road in the Village of Niles Center, is almost completed and is the largest plant in the world employing the activated sludge principle. Its cost, including the 17 mile force main for conveying the excess sludge to the West Side Sewage Treatment Works, will be approximately \$28,000,000. The plant is being built to treat the sewage, largely domestic in character, from that part of Chicago north of Fullerton

Avenue, and in addition the City of Evanston and the Villages of Wilmette, Kenilworth, Winnetka, Glencoe, Niles Center, and Niles. The portions of the plant which can readily be extended are designed for the estimated 1930 human population of 800,000 with an average sewage flow of 175,000,000 gallons per day and a maximum flow of 50 per cent in excess of the average. Parts of the plant which cannot be readily extended are designed for 1960 conditions. It will be put into operation in 1928.

The activated sludge process is the operating principle of the plant and is the most recently developed method of sewage treatment. The process consists essentially of agitating sewage in large tanks and of providing atmospheric oxygen for its bacteria by blowing air through it. During the period of agitation, which is generally from four to six hours for a particular batch, the impurities gather into small flocs, which readily settle when afforded an



Partial view of the plant, looking north-west, showing preliminary settling tanks and the main building. A section of the aeration tanks can be seen in the background.

greater than that for a less concentrated one, for the same velocity of flow, and as a result the point of tolerable purity is pushed farther and farther down-state, in front of and often through towns of considerable population.

THE COVER

The illustration on the cover is a photograph of the pump and blower room of the North Side Sewage Treatment Plant, in Chicago.

The pumps, at the right, draw the sewage from the sewer and discharge through the grit chamber to the settling and aeration tanks. The turbo-blowers furnish air for the aeration process.

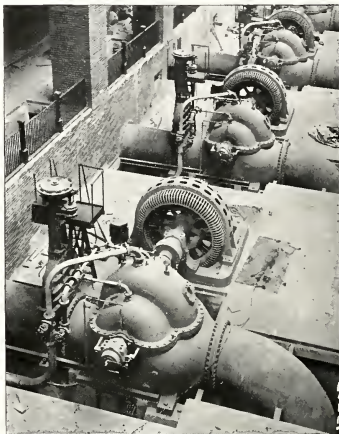
opportunity, forming a sludge which is a medium favorable for bacterial development. This activated sludge, alive with bacteria, when introduced into incoming sewage has the property of hastening the process of purification.

This brief and simplified description of the process prescribes the three most essential pieces of apparatus for an activated sludge treatment plant: pumps, blowers, and tanks. These three items practically characterize the North Side Treatment Plant.

The main pumping station and blower house contains five pumps for lifting the sewage from the north side intercepting sewer to the plant with provision for a sixth pump. The pumps work against a dynamic head of 44 feet and are driven by 6600-volt synchronous motors. Two 48-inch units, driven by 1,000 horse power motors, have a capacity of 150 cubic feet per second each, and three units, 48-inch suction, 42-inch discharge, driven by 700 horse power motors have a capacity of 100 cubic feet per second each. Here also are located the seven turbo-blowers, driven by direct connected synchronous motors operating at 3,600 r.p.m., which compress air that has been filtered, washed, and heated for aerating the sewage. All blowers are designed for a rated pressure of 7.75 pounds per square inch gauge, with air at 85 degrees Fahrenheit and barometer at 14 pounds per square inch absolute. Three units, each driven by 1,650 horse power, 6,600-volt motors, have a rated capacity of 30,000 cubic feet of free air per minute, and four, each driven by 2,160 horse power motors, 40,000 cubic feet of free air per minute. On the north side of the building above the level of the blower floor are found the air intake chambers which contain the copper wool filters, washing equipment, and heating coils. Large ducts, built vertically as part of the blower room wall permit the air to be drawn downward to the intake level of the blower and across. After passing through the blower the air is metered and then forced into either of the 60-inch mains that lead to the aeration tanks, or into both mains. This building also houses four water circulating pump units, which supply water for conditioning the air for aeration and for cooling the ventilating air of the blower motors, as well as all electrical equipment.

The electrical equipment necessary for the operation and control of the

sixteen motors already mentioned is quite extensive. All motors are remotely controlled from a 100 panel switchboard, located in the operating gallery, through 48-volt and 125-volt auxiliary circuits. Current for the control circuits is supplied by a 125-volt storage battery equipped with an end cell switch and complete charging equipment. Direct current for field excitation of the synchronous motors is normally supplied by four motor-



These huge pumps, driven by 6600 volt synchronous motors, lift the sewage to the spillway.

generator exciter sets at 125 volts, but the battery may be called upon in cases of emergency for excitation current.

The power for the plant will be furnished by the Lockport Power House (12,000 volt line) and by the Public Service Company of Northern Illinois (33,000 volt line). The difference in voltage of the two sources makes the installation of two transformer banks necessary, the transformer equipment comprising the following oil insulated, self-cooled single phase transformers:

- 4—1000 K. V. A. . . 33000-6600 volt
- 4—1667 K. V. A. . . 12000-6600 volt
- 6—500 K. V. A. . . 6600-440 volt
- 12—100 K. V. A. . . 6600-110 volt

Two auto-transformers are provided for starting purposes. Bus work is already completed for under-ground service connection with the Public Service Company's sub-station which will be constructed immediately north of the pump and blower house.

In tracing the flow of the sewage as it passes from one place to another in the process of purification it is logical to start at the main intake passing

here and there to observe construction and peculiar features of design.

The sewage is lifted from the north side intercepting sewer by the five centrifugal pumps through a four-inch grating which protects the pumps against large objects liable to damage the impellers. After passing through the pumps the sewage is discharged through ducts to a large chamber or spillway located underneath the south-west corner of the pump and blower house. From here it flows by gravity or by whatever head is developed in the spillway to the grit chamber.

A 12 by 12 foot conduit connects the spillway and the grit chamber, widening, as it approaches the latter to include the aggregate width of the 12 individual chambers. Each of the 12 grit chambers is 80 feet long and 8 feet wide and will have a flow depth varying from 4 feet in 1930 to 6.6 feet in 1960. The sewage enters the east end of the grit chambers through a port approximately 4 feet square, and as it encounters the wider 8 foot section of the chambers the velocity of flow of the sewage decreases, permitting the heavier solids such as sand and gravel to settle. The time required for the sewage to pass through the chambers is 1.3 minutes at an average rate of flow. As it reaches the west end of the chambers the sewage again is screened through grating of one inch clear openings. The individual chambers may be cut out

of service from time to time for cleaning purposes. Equipment has been installed at the North Side Works in the grit chamber building for the reclamation of the sand and gravel deposited in the grit chambers. An overhead mono-rail trolley system with an electrically operated grab bucket for cleaning the chambers, and a pneumatic ejector system for removing the screenings are provided, in addition to the grit washer.

Minus its coarsest solids the sewage passes from the grit chambers through two 8 by 8 foot conduits to the preliminary settling tanks, which are located immediately west of the grit chamber and to the south-east of the main building. These tanks are provided for the removal of oil and scum and for those solids which will settle out during a detention period of about 30 minutes at average flow. The settled sludge is swept to the centers of the tanks by clarifier mechanisms and is then conveyed by a pipe system to the waste sludge pumps, located in

(Continued on page 56)

TESTS OF WIRE ROPE FITTINGS

By P. C. HUNTLY

Associate Professor of Experimental Engineering

WITHIN the past few weeks the Department of Experimental Engineering has completed a very interesting series of tests on the relative merits of wire rope fittings. These tests were to provide a basis for comparison between the effectiveness of the old or ordinary babbitted-type of fitting and the recently developed steel sleeve processed type of fitting. Illustrations of these two types of fittings accompany this article.

As it is commonly practiced, the shackling of wire rope is far from a perfect or "fool-proof" procedure. In applying a babbitted-type of fitting to a length of wire rope for instance, the inefficient bending (or no bending at all) strands; improper brooming of wires; babbitt that is not up to proper temperature, as is invariably the case when several fittings are poured from the same ladle at the same time; using a socket that is stone cold; or any other of a number of things may happen to make the connection weak and unreliable. And the serious part of it all is, once the connection has been made and the fitting applied, there is no way to predetermine the efficiency of that connection, save by an actual strain test. And with elevator ropes, to "test" a fitting by actual work is dangerous.

Because the personal equation is so important a factor in this work, any investigation that would bring out conclusive findings would necessarily be long and comprehensive. It would be necessary that the series of tests include many fittings, and to eliminate the possibility of inaccuracies due to the uncertain human element, it would be imperative that the fittings tested be made by several different people and under varying conditions.

We therefore arranged to have the various fittings (of two types) applied by four different sources, which were: a prominent elevator company, the Underwriters' Laboratory, the American Cable Company (who furnished the wire rope), and ourselves. In all, 56 specimens were prepared (112 fittings) 37 specimens being fitted with the *Tru-Loc* or processed steel sleeve type of fitting and 19 with the babbitted fitting. Of the 19 babbitted specimens, 11 were prepared with the

strands turned out, the remaining 8 with the strands turned in. All rope used was of the preformed type, known as *Tru-Lay*, its construction being 5/8 in. diameter, 6x27, which is to say; six strands of 27 wires each.

Our attention was drawn, a few weeks ago, to the Mechanical Testing Laboratory. Looking in as we passed the door, we saw Professor Huntly "busting" test specimens of wire rope before an audience of about twenty cigar bearing data-takers.

Later on we inquired and found that Professor Huntly's audience was a group of representatives of wire rope manufacturers and users, interested in the relative merits of different wire rope fittings.

We found the story of the tests quite interesting and, thinking you would too, asked to have the story put into written form. Here it is.

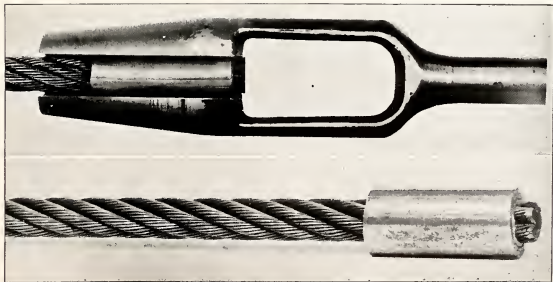
With all these specimens of wire rope and fittings assembled at the testing laboratory, the series of tests started, we keeping strict check on the exact breaking strength of each fitting, the identity of the specimen thru the number of the reel from

which it had been cut, and in the case of the babbitted fittings, the kind of application (whether the strands had been turned in or turned out).

At this point it will be of interest to know just how we attached our fittings. Babbitting a wire rope fitting is all too uncertain for safety, so that a word on this subject will in a measure indicate the kind of fitting tested. In our babbitted fitting, the method of application was as follows:

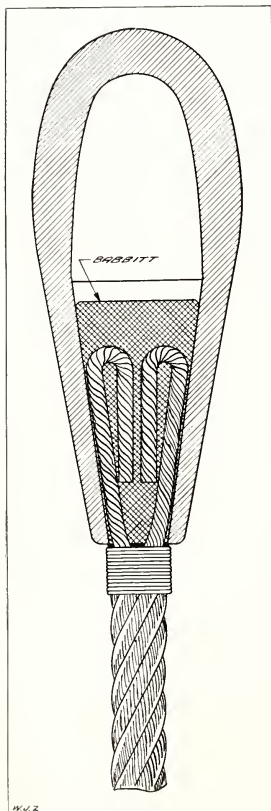
By unstranding the ends of wire rope, the individual strands were bent outward, (or in, as the case might be) after which the unlaid rope end was drawn into place in the tapered basket socket. After binding the bottom of the socket to prevent leakage of the molten metal, the babbitt was poured into the socket and made to wedge the turned strands. Only virgin metal was used for these fittings, and the ladle employed was of small size so that only one fitting was poured at a time. This kept the metal always up to temperature. Extreme care was used to get a good spread of the strands and to have each turned strand hook itself into the babbitt. The virgin metal was poured only after it had reached a temperature sufficiently high to ignite a pine stick.

That this widely accepted method of babbitt socketing wire ropes was efficiently done is evidenced by the high degree of load strain they withstood. Of the 19 fittings tested only three failed in the 12,000 pound



The steel-sleeve type of wire rope fitting. Above—the assembled fitting. Below—wire rope with steel sleeve pressed on. The sleeve, consisting of a steel jacket with an aluminum lining, is pressed on the rope under a pressure of 100 tons per sq. in.

section—the majority failing above 16,000 pounds. Naturally, extreme care in workmanship will raise the average of effectiveness for any set of fittings, but in spite of this, the inherent weakness of babbitt will invariably show an occasional fitting to have a low point of failure. It is the writer's experience, both in the laboratory and in the field, that the above is exceptional service for babbitted fittings, but even here failures occurred at points approximating 12,000 pounds, as will be seen by a glance at the accompanying chart. And it must be obvious that the lowest failure point is the only point on which safe calculation can be made.



A babbitt fitting. The strands may be turned either in or out.

In attaching the steel sleeve type of fitting, the method of application was to slip a close-fitting sleeve over the end of the wire rope. As stated above, the rope used for this practice was of the preformed type because no seizing is required at the rope end. This close fitting sleeve is essential to securing the best results.

The sleeve itself is in two parts, an interlining of aluminum and an outer jacket made of steel. The processing machine (hydraulic press) used for attaching the processed fittings has four jaws. The method of applying these attachments is to apply a pressure of 100 tons per square inch, removing the sleeve to determine, by means of a slip gauge, whether or not the fitting has been reduced to its proper diameter. In some cases it was necessary to apply the pressure as many as five times, but usually two applications were sufficient to bring the sleeve fitting to its proper size.

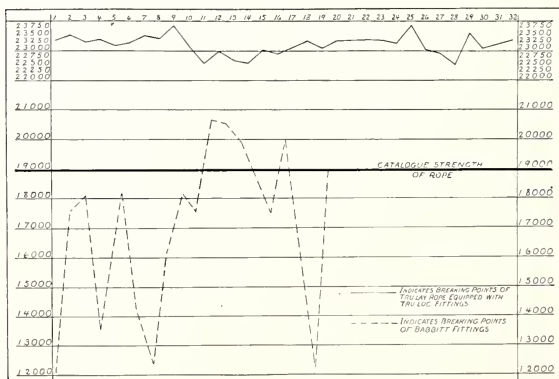
Just what were the results of the breaking strength tests of these 56 specimens is graphically shown in the accompanying chart. The upper, solid line, across the top of the chart shows the breaking points of the 32 wire ropes equipped with the steel sleeve fittings (processed type). Note the extreme uniformity in the breaking points of the rope equipped with the processed fitting. Indeed, the greatest variation in any rope using the *Tru-Loc* sleeve fitting was 1,270 pounds and it should be emphasized that in all cases the minimum breaking point was over 3,000 pounds above the catalog strength of the rope. This

variation is, indeed, no greater than would be found in steel bar breaking tests, so that we may safely say these 32 specimens gave perfect performance.

The dotted line indicates the breaking points (or rather points of failure) with the babbitted type of fitting. *Points of failure* rather than *breaking points* since in every case the rope pulled out of the babbitt fitting. It is well known that with babbitt, slippage begins almost as soon as the load is applied, while in every case the processed fitting held with practically no slippage up to the catalog strength of the rope and, after breaking its cable, the maximum slippage noted was 1/16th inch. With the babbitted type of fitting the variation (with rope from any one reel) runs as high as 8,500 pounds and never lower than 5,360 pounds.

The effectiveness of the processed fitting depends on two things; first—the amount of shrinkage given the sleeves which causes the metal to cold-flow and grip the rope; second—the length of the fitting.

Another feature of the processed attachment, which in my mind is most important, is the ability to predetermine accurately the effectiveness of the fitting. Because the metal is cold-flowed around the strands and into the interstices by hydrostatic pressure, the diameter of the sleeve is thus reduced. Hence the simple operation of slipping an external circle gauge over the fitting applied will indicate the degree of grip imposed on the wire rope and the effectiveness of the attachment.



Results of the tests. The numbers across the top are the specimen numbers. Note the uniformity of the steel sleeve fittings as compared with the babbitt fittings.

AFTER GRADUATION—WHAT

By WALTER J. ZENNER, '28

Student in the Department of Electrical Engineering

ENGINEERS are generally conceded to be most proficient in the art of solving difficult problems. This proficiency, unfortunately, seems to be limited to the solution of the other fellow's problems. This article is a discussion of the solution of one of the most perplexing problems of the young engineer—that of planning for the years immediately following graduation.

"What shall I do after I graduate?" that is the question. The question really goes deeper than the simple choice of an employer. "What am I best fitted to do" would, perhaps, be the better question. It is a question which should have been considered in the selection of a high-school course, and in the selection of a college course. Many students, as the day of decision approaches, have a feeling way down deep somewhere that their love for the engineering profession has cooled somewhat. Their classmates, however, are signing up with engineering firms and as the various company representatives call for interviews, the temptation to join the crowd is strong. Perhaps the questioning one signs—or perhaps he sits down to think about it and decides to study law—or to go back to the farm.

Professor E. B. Staveland of Pennsylvania State College has prepared some interesting performance curves

for engineers: a copy accompanies this article. The men in group one did not find themselves, those in groups two and three did. Note the difference in their progress.

The student is not the only one who is thinking about the question. There is a large turnover in employment during the first two years after graduation. Graduates are trying to find themselves, to find the work for which they are best fitted. Since much of this time is spent in training, at a low rate, this large turnover represents a loss both to the individual and to the company. The individual may credit himself with a certain amount of experience gained—the company can only charge a loss.

Naturally, organizations employing large numbers of college men have given considerable thought to the problem of properly placing college graduates. John Mills, Personnel Director of the Bell Telephone Laboratories, in a paper on *Selecting and Placing College Graduates in Business* tells of a system of questioning used to determine the aptitudes of the candidate. Quoting:

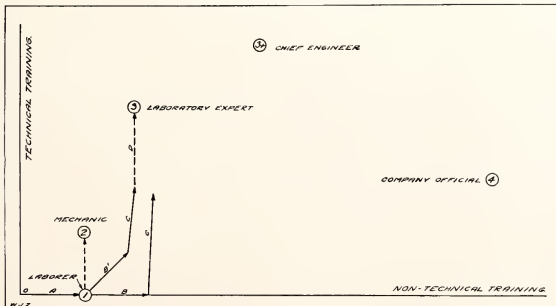
"The first question assumes that the applicant is looking for a job that will lead to a career, that is to the expression of his personality through some medium, just as an artist chooses a medium for his self expression. For

this let us assume four media, namely those of:

Ideas
Men
Things
Economic symbols

The philosopher has his career almost entirely in the medium of ideas, a politician in that of men, a mechanic in the field of things, and a statistical economist in that of economic symbols. But there are combinations of these fields with primary and secondary interests; thus a good teacher is usually interested in ideas and men, a business promoter in men and economic symbols, a research scientist in things and ideas; and so on. It is illuminating to have each applicant write these four media in his order of relative interests. When that is done, and leaving out of account certain typical arrangements which are common to the engineering and scientifically minded, we usually find the salesman or business manager type expressing his preference in the order of men, economic symbols, things, and ideas. The type to be concerned with the management of technical processes expresses the interest as men, things, ideas, and economic symbols, or as things, men, ideas, and economic symbols, if he will take more interest in the equipment than in the human beings with the management of which

CHART YOUR COURSE



WITH technical training plotted as ordinates and non-technical training plotted as abscissae, this diagram attempts to show the relative values of each required for various classes of employment.

The progress made by a typical engineering college graduate is also indicated. *A* represents childhood and grade school training, *B* so-called academic high-school training, *B'* technical high-school training, *C* and *C'* technical college training, and *D* practical experience.

It has been said that a man's success is determined not by what he does during working hours but by how he spends his leisure. During working hours an engineer obtains almost purely technical training. If he is to go far, some horizontal motion is necessary.

The numbered circles refer to the four divisions of labor.

Performance Curves of the Engineer*

ENGINEERS describe the characteristics of machines in a very clear and comprehensive manner by means of performance curves which show how these machines behave under different conditions of operation. The performance of the engineer himself may also be described by curves, one of the most important of which is a curve showing the progress made by the engineer after his entrance into the profession.

If we attempt to prepare a curve of the type just mentioned we are at once confronted by the fact that we have no accurate method, or system of units, which we may apply in measuring the progress made by an engineer during a certain interval of time. Curves which are satisfactory for our purposes may be prepared, however, by comparing the progress of one engineer with that of another. By making such comparison we find that we may divide engineers into three groups, and that the progress of the men in these groups is well described by the accompanying curves.

Group 1 includes those engineers who make progress slowly for several years after entering the profession, and who then fail to make appreciable progress in the years following. It is unfortunate that a comparatively large number of engineering graduates perform according to this curve. One class includes those who are not naturally qualified for engineering work; another class includes those who have not been successful due to causes beyond their control, and a third class includes those who might have been quite successful if they had not been lacking in certain important personal qualifications.

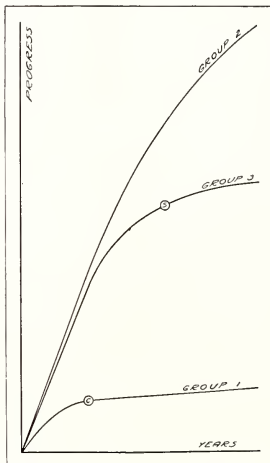
The engineers of Group 2 continue to make marked progress throughout the period of their active participation in engineering activities. This group includes

he is concerned. Your advertising man, personnel worker, and the like will favor the order: men, ideas, things, economic relations. And your expert on costs and accounting, the order: ideas, economic symbols, men, and things."

This indicates one method of attacking the problem. The difficulty perhaps lies not so much in the determination of a method of attack as in the lack of a determination to attack.

What are *your* aptitudes? Students spend considerable energy in the solution of problems, just for the exercise. Here is one which will provide ample exercise and, moreover, will give real results. Try to strip yourself of all prejudices and preferences and solve it as you would an engineering problem, with a mind open for new ideas and sincere in the search for the truth.

Should you decide on some field outside of the engineering profession, do not consider the past four years



Performance curves, showing the comparative progress of different engineers.

ONE ship drives east and another west

With the self same winds that blow.

'Tis the set of the sails and not the gales

Which decides the way to go.

Like the wrecks of the sea are the ways of fate

As we journey along through life.

'Tis the will of the man that decides the goal

And not the result of strife.

wasted, for an engineering education, due to its training in the logical and common-sense application of fundamentals, provides an excellent foundation for almost any structure.

In addition to choosing a field, or a direction for your future endeavor, it may be interesting to consider choosing a goal. Soon after a child learns to talk, he begins formulating ideas as to what will be achieved "when I get big". The first aspiration may be to that noble and romantic height—a policeman. As the boy grows, and goes through grade school and high-school, his aspirations grow. He wants to be a chemist, or a lawyer, or a surveyor. He goes to college and

a comparatively small number of men.

An engineer whose career is of the type described by the curve for Group 2 must possess certain special qualifications in addition to those generally understood to be essential for success in engineering. After being advanced to a higher position he is at once actuated by two motives: to master the duties of his new position, and to prove to his superiors that he is "too big for that job." Throughout his career he retains this determination to make progress, and is constantly preparing himself to assume greater responsibilities. We can readily understand why continued progress is made by an engineer who strives for advancement in this manner.

Most of our engineers fall in Group 3. These men make marked progress for a time, then "slow up," and finally their curve becomes practically flat. The performance curve of this group has a shape which is similar to that of the magnetization or saturation curve of an electrical machine, a curve which shows that "saturation" of the magnetic circuit of the machine occurs under certain conditions of operation. This at once suggests that the engineer too may have a "saturation point." There is no doubt but that many engineers actually do reach a saturation point beyond which they are unable to advance. This is to be expected because every man has certain limitations—mental, physical, or otherwise. Since the limitations of different individuals vary in kind and in degree, one engineer may reach his saturation point in fifteen years while another may not reach his saturation point until fifty years after entering the profession.

*Abstracted from an article by Prof. E. B. Staveley, Pennsylvania State College, in the *Penn State Engineer* of December 1927.

his outlook on life broadens, his objective becomes more definite, but growing all the while.

The value of a definite objective cannot be denied. The story of the life of Napoleon is an illustration of what can be accomplished by a driving force directed toward a definite objective. Cardinal Richelieu said "I accomplished much because I set myself strict limits in what I undertook to do." Using the same reasoning as that contained in "No wind is favorable to a ship without a port", choose some definite objective in your chosen field. Choose it, not with the idea of stopping there when it is reached, any more than the shipmaster would think of docking permanently upon reaching port, but rather as a way station on a line of infinite length. For your final goal, as Emerson suggests, "Hitch your wagon to a star."

Dean Monin, in his lectures on economics, pointed out four divisions of labor:

(Continued on page 56)

THE ARMOUR ALUMNUS

J. WARREN McCAFFREY, '22, Editor

NEWS OF ARMOUR ALUMNI

Norman Ostrin, '25, who was formerly a service engineer for the Iron Fireman Manufacturing Company of Cleveland, Ohio, is now employed by the Joseph Harrington Company as one of their representatives. The Harrington Company handles the stoker business for the Whiting Corporation and Ostrin's previous experience with stokers should stand him in good stead in his new position.

Fred E. Busbey, '20, dropped in at the Institute to say hello. Fred has left the Continental First Mortgage and Bond Co. and is now with Lawrence Stern & Co. at 231 So. LaSalle St. He is living out in the Beverly Hills district at 9144 Hoyne Avenue.

Engineering data from the laboratory of Leslie F. Muter bears the initials of F. J. E. which happens to be Fred J. Ewald, '27. Fred is a radio engineer for the above concern which makes all types of radio equipment. He spoke to the AIT Radio Club several weeks ago and from what the boys have said, it surely was an interesting talk.

William Vervurka, '27, is an engineer in the Department of Water at Gary, Ind.

R. A. Harschnek, '27, and Johnny Janak, '27, are engineers in the Planning Department at Swift & Co.

Received notice last week from Mrs. Herman H. Gaul of the death of her son, Carl C. Gaul, '25, on June 3, 1927. After graduating from the civil engineering department he was employed as a draftsman by the American System of Reinforcing. His home was at 1530 Hoyne Avenue, Chicago, Illinois.

We are very sorry to hear of the passing of this alumnus and extend our deepest sympathy to the friends and relatives of the deceased.

Received a Babygram dated November 13 from the Baby Telegraph and Cable Company. It was addressed to friends and relatives everywhere and read as follows: I arrived safely care of Mr. and Mrs. Frank H. Waver, '25. Dad and mother very happy. Glad to say my name will be Frank H. Waver II.

We take great pleasure in announcing the arrival of David A. Parreira III. He is the first child of Mr. and Mrs. David A. Parreira. His father graduated in architecture in 1918 and is employed by the Chicago Art Marble Company. The family are at home to their friends at 4323 Ellis Avenue, Chicago, Illinois.

John R. LaVally, '16, has changed from the Super Heater Company for whom he was district engineer at Pittsburgh, to the sales department of the Erie City Iron Works, Erie, Pennsylvania.

CARL STOCKHOLM RIDING IN SIX-DAY BIKE RACE

One of the main sporting events taking place in Chicago this month is the six-day bike race staged at the Coliseum. There is no doubt but the students at Armour Institute and the alumni would be greatly interested in learning that an Armour man



Carl Stockholm

is a member of a team which, because he is a member, is a top heavy favorite to win the long grind.

Carl Stockholm entered the Institute in 1920 and left in 1922, when he abandoned his course in architecture to pursue the more fascinating sport of professional cycling. A review of his accomplishments as a bicycle rider since he took up that form of sport to limber up his knee, which had been swollen and stiffened from a wound received while serving with the army of occupation on the Rhine frontier, would lead anyone to the conclusion that his desertion of the drawing board has been a very profitable move for him. While a student at Armour Institute in 1920, he made the United States cycling team, participating in the Olympic games. During the winter in-door season 1920-21, he won the Western Amateur Championship. In 1921, while still a student at the Institute, he finished third in the National Bicycle Championships and in 1922 he turned professional and participated in Chicago's six-day bike race; paired with Alfred

Grenda he finished fifth at his baptismal effort. He has won the all-around bicycle championship of the four New England tracks—in Boston, Providence, New Bedford and Worcester—three times, once each in 1923, '24 and '25. In this competition he scored during the three years a total of sixty-eight firsts, and seventy-two seconds.

Paired with "Hy" Kockler, another Chicago rider, as a team-mate, he won the Chicago six-day race in November, 1923. This great feat was all the more remarkable because the last four days Stockholm nursed, if such a thing is possible while participating in one of these six-day grinds, a broken shoulder. He drew the winner's purse in the six-day race held in Chicago last March when, with only one week's rest after a similar race in Madison Square Garden, New York, he paired with Franco Georgetti and outrode that great champion of the track, Reggie McNamara and his partner for the winner's purse.

Carl Stockholm, the "Ever Smiling Carl," is looked upon as one of the outstanding stars of the cycling sport and has teamed with a great many of the sport's notables including, "Hy" Kockler, Harry Kaiser, Tony Beckman, Bill Grimm, Charley Winter and Freddie Spencer. He has always given his best efforts and as a result is much sought after as a team-mate in the six-day sport. When paired with Kockler, their team has always been enthusiastically followed and their efforts roundly applauded. Stockholm is rated as an excellent drawing card in New York City.

When not engaged in activities of his favorite sport, Stockholm manages the north-side plants of Becker Cleaners and Dyers. Being interested in the firm he manages to devote considerable of his time to the job. When asked how he is able to make these trips for two weeks at a time to Detroit and New York and be absent from his business, he replied that Mr. Becker, his employer, is an ardent bike fan and even makes trips himself to view special races. However, while possibly excused while on these trips, "Stocky" makes up for the time he has been away by diligently applying himself to his work when not racing.

His smile, which is one of his striking features, is contagious and together with his whole hearty efforts and good sportsmanship while riding has made him just as popular in New York as in his home town, Chicago. He is living at 4940 Ferdinand Street.

Although the lure of the banked track was too great for Stockholm to resist, and resulted in his abandoning his studies in architecture, he is still greatly interested in that kind of work. And because his younger brother shows an inclination, he is planning on sending him to Armour Institute to study architecture next fall.

Received a letter from Louis P. Allaire, Jr., '27, one of last year's graduates from the Fire Protects. He is working for the Iowa Insurance Bureau at the Cedar Rapids branch. He paid Chicago a visit for a

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THE NORTH SIDE SEWAGE TREATMENT PLANT

(Continued from page 50)

the main building, which pump the sludge through a 14-inch cast-iron discharge sewer 17 miles long to the West Side Sewage Treatment Plant where the sludge is pressed and dried into fertilizer. The oil and scum are removed manually and conveyed to a grease separation tank in the grit chamber.

The three batteries of 12 aëration tanks each receive the sewage comparatively free of heavy solid matter from the preliminary settling tanks. A double barrel conduit each barrel being 8.33 feet wide by 8.75 feet high, permits flow from the preliminary settling tanks to the aëration tank batteries by branching into three conduits, 6.75 feet wide by 7 feet high. It is in the aëration tanks that the sewage and the conditioned air are brought into contact with the aim of speeding up the bacteriological process alluded to previously.

An understanding of how this is accomplished cannot be completely gained, of course, without a knowledge of chemistry and bacteriology, yet a description of an aëration tank might make it easier to take some things for granted.

Each aëration tank is 420 feet long and 32.3 feet wide, divided into two parts by a longitudinal wall. About three feet below the top of both walls are cast baffle plates of concrete, at an angle of about 45 degrees, the purpose of which is to aid in starting and maintaining a rotary motion of the sewage in the tank as the air is forced through. At the bottom of the tank are two parallel channels each about three feet wide by one foot deep. Cemented into these channels, flush with the bottom of the tank, are porous diffuser or aëration plates through which air may be forced with comparatively little pressure drop. The air main for each compartment or tank is suspended about six or eight feet above bottom and drop pipes tap off from it throughout its tapering length leading to the space underneath the diffuser plates. The path of the air, after leaving the 60 inch mains located under the floor of the operating gallery, is through the compartment main to the chamber under the diffuser plates, by means of the various tap-offs, then through the plates in the form of uniformly distributed currents of bubbles aërating the sewage in its journey to the free atmosphere above.

The turbulent mess of organic matter contained in these tanks, through which comparatively warm air is fairly sizzling, furnishes fine opportunity and

proper food for breeding bacteria. It is here that the impurities gather into small flocs which when allowed to settle form the activated sludge, a medium so favorable to bacterial development.

The operating gallery, containing the valves and meters necessary for controlling the influx and efflux of sewage to and from the tanks, separates the aërating tanks from the settling tanks. There are 30 final settling tanks, for settling the aërating sewage, arranged in three batteries of ten tanks each. Each tank unit is 77 feet square with a water depth of 16 feet at the center. The aërated sewage flows from the aëration tanks to these settling tanks where the flocs of impurities are allowed to settle into activated sludge. The settled sludge is swept toward the draw-off pipes at the tank centers by the same clarifier mechanisms used in the preliminary settling tanks. The liquid in the tank is the purified sewage minus practically all solid matter. It is approximately 85 per cent pure, practically odorless and fish will live in it. This liquid is then discharged into the North Shore channel, which is at present part of the dilution system of the Sanitary District.

The process of sewage treatment at the North Side Plant is thus traced to its final product, inoffensive and non-polluting sewage. Although the excess activated sludge is a by-product that must be disposed of, part of it is put to use as an aid in breeding bacteria in incoming sewage.

The main building houses the pumps that return the activated sludge to the incoming sewage. There are four of these sludge return pumps directly connected singly to 50 horse power, 440 volt variable speed induction motors. These motors are controlled by a float-operated liquid controller so that their speed bears a direct relation to the influx of sewage. The building also contains two waste sludge pumps for pumping the excess sludge to the West Side Works. Each is a centrifugal pump with a rated capacity of 1,000 gallons per minute against a total dynamic head of 180 feet, driven by a 100 horse power, 440 volt motor. The central tower of the main building contains the offices of the administrative staff and the laboratories. The east wing contains three 84 inch by 63.4 inch master meters, for measuring the flow of sewage to the three batteries of aëration tanks, the accommodations for the men about the plant, and space for storage.

Mention of the service building completes the plant. It contains a central boiler plant with four oil-fired 500 horse power boilers for supplying steam for heat and for conditioning

the air. It also houses maintenance shops as well as the necessary boiler feed and fuel oil pumps. A 150,000 gallon water tank is carried in a tower forming part of the building. Two underground fuel oil storage tanks, each of 220,000 gallons capacity, are provided adjacent to the building along the right of way of the C. & N. W. Ry., which passes directly through the plant property.

Of the \$28,000,000 cost of the plant, probably only 33 per cent is represented above ground and visible, and it is therefore difficult to gain a true appreciation of its magnitude. It is as great as its task; the insurance of health and sanitation of 1,000,000 persons. The North Side Treatment plant will stand ever as a monument to Chicago's fight against odds for health; its cost as a measure of the dauntlessness of the "I will" spirit.

AFTER GRADUATION—WHAT

(Continued from page 54)

- 1 Men who *move* things.
- 2 Men who *make* things.
- 3 Men who *plan* things.
- 4 Men who *determine policies*.

In which of these would you place your goal? Unless you are preëminently interested in *things*—, you will put your check opposite the fourth. This, being the most highly remunerative—from a standpoint of dollars, at least—, should naturally be most popular. Yet it is significant that very few engineers reach this objective. An analysis of the requirements for the various divisions, as is illustrated in the diagram, throws some light on this.

It would seem that, if a man is to go far, he must be well grounded in the principles of business—economics. Engineering courses are so full with the technical matter which must be included, that there is little room left for the more general subjects. As a matter of fact, complaints are sometimes heard of the difficulty of crowding a commerce education into four years. If neither can be completely covered in four years, it is the height of folly to look for both. The best answer seems to be, don't stop studying after your four year course. The possession of a diploma does not indicate the possession of an education.

The fact that an engineering degree is not sufficient equipment for a successful career is shown by the Mann report of the Carnegie Foundation. This report lists the qualifications for an engineer, in the order of their desirability, as: character, judgment, efficiency, understanding of men, knowledge, and technique.

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Our Slogan: Make The Armour Engineer the best technical college publication in the country

*Let us endeavor so to live that
when we come to die even the
undertaker will be sorry.*

—Mark Twain.

ONE of the most difficult problems which confronts the young engineer is that of finding his proper place in industry after graduation. Each year, representatives of various companies call at the Institute to interview seniors. The arrangements for these interviews are left largely to the representatives and to the students. The faculty are interested in the student and his problems and undoubtedly are anxious to help him, but the student must take the initiative and find himself a sympathetic professor before he can ask for advice.

In nearly every corporation of importance, you will find a personnel division—a group of men who make a business and a science of the problem of employees' welfare. Further, in every important industrial country, with the exception of England, you will find a national organization for the study of improved methods of industrial management, which includes personnel problems.

Purdue University, in its engineering school, has organized a personnel department. At the beginning of the senior year, students are provided with names of companies in whose employ they might find an opportunity to apply their training. The

students select from this list the names of companies with which they would like to make contacts and report to the Director of Personnel, who writes to these companies to arrange for interviews.

Companies are asked to submit specifications of their offers. The personnel department compares its record of the interests and qualifications of the student with these specifications, and accordingly is in a position to offer real advice.

The estimated cost of educating a student is \$1,148.00. The expense of placing him is estimated as five dollars. It certainly seems worth while to properly place a graduate after spending so much money to educate him. It has been found that it takes about five years for an engineering graduate to get permanently established. The personnel department at Purdue hopes to cut this to two years. This labor turnover is of considerable interest to employers. They are, themselves, trying to reduce it.

Hundreds of letters, complimenting the system, have been received by Purdue from the industries. The Indiana Manufacturers Association has registered its approval by furnishing the initial funds and by carry-

ing a substantial part of the current expenses.

At Armour the personnel work is divided between the President's office, the Office of the Deans, the Alumni office, and all of the members of the faculty. While such a wide interest is unquestionably inspiring, a centralized organization might prove more efficient.

WHY do industrial concerns advertise in engineering college magazines? When this question is put to a student, the reply—if he has given the subject enough thought to enable him to formulate a reply—is generally an expression of the idea that the company has certain superfluous funds which it benignly bestows upon the struggling publication.

We admit that the national advertisers, who use most of the advertising space, can hardly expect to sell telephone systems, elevators, or foundations to students. Immediate results are evidently not expected.

As a matter of fact, this advertising does not come unsolicited. It must be sold. And to sell on a national basis, the product must have real value. The foremost of the engineering college magazines in this country have formed an association, *Engineering College Magazines Associated*. Acting as a unit, with a single advertising agent, this group offers a proposition worth considering.

Through this medium, industrial organizations can gain the attention of a host of embryo engineers—the engineers of tomorrow. A concern which expects to do business in the next few decades is interested in the men who will be writing engineering specifications during the next few decades. National advertisers who use college publications are looking to the future—they are casting the proverbial bread upon the waters, expecting a return.

Such advertising, of course, is valuable only to those concerns which expect to stay in business a number of years—it is an indication of the stability of the organization. These advertisers are not merely producing profits but are building institutions.

AMONG the candidates for nomination in the 1928 presidential election, for the first time in many years, we have an engineer. During the past ten years, Herbert Hoover has rapidly gained favor in the eyes of the public.

Mr. Hoover seems to be a living rebuttal of the argument that engineers do not qualify for important administrative positions. It is true that few engineers are to be found in positions of political prominence, and that the number of lawyers in Congress exceeds the number of engineers, but we can be assured that the path of engineering training is not blocked in this direction, for here is one who has followed it.

There is no question of Mr. Hoover's ability as an engineer. His years of professional work in the mines, railways, and metallurgical works of the United States, Mexico, Canada, Australia, Italy, Great Britain, South Africa, India, China and Russia testify to this. His work as Secretary of Commerce in directing the handling of the country's food supplies during the war, and his successes as director of various economic measures in Europe following the signing of the armistice offer an indication of his ability in solving economic problems. The readiness with which people accepted his direction of the Mississippi flood relief work demonstrates their faith in him as a leader.

COLLEGE NOTES

Honorary Fraternities Meet at Joint Banquet

SCHOLASTIC STANDINGS

The following statistics, compiled by the Office of the Deans, give the scholastic standing of the members of the freshman, sophomore, junior, and senior classes of the College of Engineering and Architecture, who were in attendance during the second semester of the school year, 1926-27. In this computation the grades in physical training were omitted. A credit (Cr.), either for work at Armour Institute of Technology, or for work elsewhere was considered equivalent to a grade of "C."

The average of the entire school body, a total of 748 students, is 86.5%.

The averages of the various organizations are as follows:

The senior class	87.9%
The junior class	87.2%
The sophomore class	86.2%
The freshman class	85.2%

The student with the highest average in the senior class is Mr. Maurus T. Goetz. His average is 95.3%.

The student with the highest average in the junior class is Mr. Leslie J. Anderson. His average is 96.6%.

The student with the highest average in the sophomore class is Mr. Joel M. Jacobson. His average is 96.7%.

The student with the highest average in the freshman class is Mr. E. Percy Boynton. His average is 95.0%.

Mechanical Engineering Department	87.2%
Electrical Engineering Department	86.6%
Civil Engineering Department	85.8%
Chemical Engineering Department	87.7%
Fire Protection Engineering Department	86.8%
Architectural Department	84.5%

The Honorary Fraternities

Tau Beta Pi	93.2%
Eta Kappa Nu	91.7%
Scarab	87.4%
Phi Lambda Upsilon	91.8%
Salamander	91.7%
Chi Epsilon	91.4%
Pi Tau Sigma	91.7%
Pi Nu Epsilon	90.5%
Phi Xi	89.1%

Social Fraternities

Phi Kappa Sigma	86.1%
Delta Tau Delta	85.6%
Theta Xi	85.8%
Sigma Kappa Delta	87.0%
Phi Pi Phi	86.6%
Triangle	88.1%
Sigma Alpha Mu	86.4%
Rho Delta Rho	86.7%
Beta Psi	88.19%
Kappa Delta Tau	88.18%

The average of all students belonging to the Phi Kappa Sigma, Delta Tau Delta, Theta Xi, Sigma Kappa Delta, Phi Pi Phi, Triangle, and Beta Psi (Fraternities that rent or own their own chapter houses) is 86.8%.

The average of all other students is 86.3%.

HONORARY FRATERNITY BANQUET

The first function perpetrated by the Honorary Fraternity Council was a banquet on the evening of December 8, at The Electric Club of Chicago. Here gathered the honorary fraternity men, both past and present active members. As the men gathered about the banquet tables old friendships were renewed and many new acquaintances were made.

Prominent alumni could be seen here and there and most of the outstanding men in the senior class were present. A hearty

A POINT OF VIEW

I Do not know what I may appear to be to the world, but to myself I seem to have been only like a little boy playing on the seashore, and diverting myself in now and then finding a prettier shell, or a smoother pebble than ordinary, whilst the great ocean of truth lay all undiscovered before me.

—Newton.

meal, a couple of good old college songs, and several good jokes put everyone in high spirits.

This was followed by some good entertainment from the Stresses and Strains and by professional entertainers. At the speakers' table could be seen President Raymond, Dean Palmer, Dean Penn, Prof. Peebles, Prof. Hendricks and Mr. A. A. Hofgren, former national president of Eta Kappa Nu. With Prof. Peebles acting as toastmaster, the speech making soon got under way. Each of the speakers had a splendid message to give to the gathering.

During the latter part of the evening the gathering was turned into a meeting to discuss certain changes in honorary fraternity affairs with George Von Gehr, president of the Honorary Council, presiding. At the close of the banquet everyone present agreed that the first honorary banquet had been a huge success.

IF YOU have a black cat, put it in your pocket and come to the Junior Class Dance at the I. W. A. C. on Friday evening, January 13. The music will be furnished by Jinx Bryan.

This dance will open the junior class social year—which means that it will be one of the season's best. The class of '29 has a big year ahead, with the Junior Prom and Circus Day.

It is not necessary to say that the year will be a successful one, if the past is any indication of the future.

NEW BOOKS IN THE LIBRARY

HARROW, BENJAMIN. *Eminent Chemists of Our Time*. Van Nostrand, 1927. The achievements of eleven of the outstanding chemists with allusions to many others.

LINDERBERGH, CHARLES A. W. Putnam, 1927. This is Linderbergh's own story of his life, especially his flying experiences.

LOWES, JOHN L. *Road to Xanadu*. Houghton-Mifflin, 1927. An interesting and entertaining study of the two poems of Coleridge, *The Rime of the Ancient Mariner* and *Kubla Khan*.

MANLY, BURNS, ed. *Best Plays of 1926-1927*. Small, Maynard Co., 1927. The plays chosen as best are: *Chicago*, *Constant Wife*, *Road to Rome*, *The Play's the Thing*, *Silver Cord*, *Card Song*, *Doisy Mayne* and *In Abraham's Bosom*. Over half the book is given to a statistical summary of the plays of the year and biographical notes on the authors and actors.

SANDBURG, CARL. *Abraham Lincoln*. Harcourt, 1926. One of the most interesting biographies of Lincoln. Mr. Sandburg himself grew up in the section of the country where Lincoln spent the greater part of his life; this enables him to write of Lincoln in such an intimate manner.

TALLMADGE, THOMAS E. *Story of Architecture*. Norton, 1927. This is the first consecutive history of architecture in America from the earliest settlements to the days of the skyscraper. It is written for the general reader in non-technical terms.

WATSON, WILBUR J. *Bridge Architecture*. Helburn, 1927. Contains two hundred illustrations of bridges of the world, both ancient and modern. The text avoids as much as possible technical terms and data.

TWO MUSICAL CONCERTS PRESENTED

On the morning of Monday, November 7, the Armour Tech musical clubs presented their first concert of the season. Interest and expectation ran high throughout the campus as was evidenced by a full house. A goodly number of our faculty were also present. Such hearty support must be complimented. It was greatly appreciated by the various musical organizations.

George Rezac and his band started the program with a lively march entitled *Them Bassees* by G. H. Huffine. This number was played primarily to "show off" the newly acquired bass section. Their second number was a march from Verdi's opera *Aida* as arranged by D. W. Reeves. These renditions were well played and brought down the house.

The Glee Club with thirty golden voiced Apollos then sang two delightful numbers. They were: *I Passed By Your Window* and *Prayer of Thanksgiving*.

This was followed by the orchestra, with George Miniberger conducting, offering two

(Continued on page 60)

FRATERNITIES

A True Friend to A Man is a Friend to All His Friends--Wycherley

TAU BETA PI

Beta chapter of Illinois wishes to announce the pledging of the following men: W. A. Anderson, O. R. Besch, R. K. Langgan, I. B. Luth, O. W. Sandborg, C. Vander Molen, W. J. Zenner, J. W. Manz, and R. J. Guenther.

These men were pledged on Wednesday, November 23, at a pledging smoker held at the Tau Beta Pi rooms, several faculty members being in attendance.

The chapter loyally supported the inter-honorary fraternity banquet held on December 8 at the Electric Club. It is but natural that Tau Beta Pi should play a leading part in the newly organized honorary fraternity council which sponsored the banquet.

On Wednesday, November 30, an informal smoker was held at the Sigma Kappa Delta house at which Brothers Kapke and Gramer gave detailed reports of the proceedings of the Columbus convention. This was the first of a series of smokers to be held during the year.

Sphinx

Matters have been moving right along in Sphinx, the honorary fraternity for work on the publications. A pledging smoker was held at the Sigma Kappa Delta house in November at which time the following men were invited to wear the yellow and black ribbons of Sphinx: O. R. Besch, H. E. Eichen, and J. T. Even.

At the recent banquet held by all the honoraries, Sphinx was well represented and voted the affair a success.

PI TAU SIGMA

Delta chapter of Pi Tau Sigma wishes to announce the pledging of the following men: C. L. Lohner, G. V. Minniberger, A. B. Smith, M. J. Kittler, J. W. Manz, and F. C. Theede.

The initiation of these men took place on Monday, December 19, 1927, the banquet being held at the Great Northern hotel. At this time, also, Prof. R. V. Perry, director of the evening classes, was initiated as an honorary member. Prof. Roesch, toastmaster, donated prizes valued above \$2,000 including one share of stock par value \$1,000 and one share par value \$500 and several promissory notes, for the best speeches of the evening, and also for the best looking alumnus, active, and initiate. The final award of these prizes will be announced at a future date, after the judges have had time for deliberation.

Delta chapter has secured the next national convention to be held at Armour in the fall of 1928. There are at present nine chapters, most of them in the Middle West, of which Delta chapter is the fifth. The success of this undertaking will require the cooperation of every active and alumnus.

ETA KAPPA NU

After having comfortably settled ourselves in our newly decorated rooms, the actives of Delta chapter proceeded to set the machinery for the fall pledging in motion. On the afternoon of November 3, the following men were pledged to Eta Kappa Nu: L. F. Bernhardt, A. H. Everly, R. J. Guenther, B. W. Hindman, W. A. Neath, P. W. Steinert, and G. O. Vandavey.

At the student session of the A. I. E. E. regional convention, held at the Drake hotel,

I wonder if there is anything in this world as beautiful as good, strong friendship between two men. They don't go round doing the mollycoddle act; they don't kiss each other every time they meet; in fact, they never do kiss each other, unless one is lying cold in death, but they are sure one knows the other is always going to stand by him, and they feel that no matter what happens, each can rely on the other.

—Anonymous.

Delta chapter was present with a 100 per cent attendance. Bro. L. J. Anderson, chairman of the local branch, took care of the general arrangements and served as master of ceremonies at the smoker which followed. Delta chapter again turned out in force for the Inter-honorary Fraternity Banquet held on December 8, at the Electric Club of Chicago.

The formal initiation followed a banquet at the City club on December 20. After an enjoyable evening, with cheery wishes for a mutually "Merry Christmas," the chapter disbanded for the holiday season.

CHI EPSILON

Chi Epsilon takes pleasure in announcing that J. B. Lodeski, W. F. Straits, and A. C. Tully have been initiated into the fraternity. We did not have a strenuous pledge period, nor did we use any methods which would tend to bring down the respect which we feel is shown for the honorary fraternities at Armour. The members of Chi Epsilon feel that after a fellow has been at Armour for six or seven semesters, it is not necessary to put him through a series of foolish stunts to determine whether he has the necessary qualities for membership. Rather, we have watched him for a time when he is

under ordinary circumstances, and nothing he would do while performing foolishly around school would have much effect on our opinion of him.

The initiation was held on the night of December 14. The formal initiation was held at the Triangle house, after which the members and former pledges had dinner with the professors and some of the alumni at the Tip Top Inn. After swapping yarns for a while, we traveled over to the Woods, where Queenie Smith acted as "mistress" of ceremonies for the evening. Of course we enjoyed the affair and were sorry more initiations couldn't be held each semester.

PHI LAMBDA UPSILON

Any careful observer about the Institute could not have failed to observe the instruments of the chemical profession hanging pendant from the necks of temporarily dejected pledges. On November 10 the following men were pledged to Omicron chapter of Phi Lambda Upsilon, honorary chemical fraternity: M. P. Johnson, A. J. Stabovitz, and J. R. Yount.

The pledges furnished the entertainment for the evening by a demonstration of technique and proficiency which was far from being a criterion for chemical manipulation, but which was, nevertheless, a sure cure for hypochondria. The pledge smoker was well attended by alumni members of Phi Lambda Upsilon living in and near Chicago. Omicron chapter looks forward to a semester full of varied activities.

PHI KAPPA SIGMA

Alpha Epsilon of Phi Kappa Sigma extends to professors, the student body, and to the fraternities of Armour, a sincere wish that the new year will be a happy and a very successful one.

Activities of the chapter came to a close for last year with a house dance on Saturday, December 17. Despite the atmosphere of the house, decorated with icicles, snow, and "northern lights" the dance was "hot," and "a good time was had by all."

Besides the resolve to "study and make up our back work," during Christmas vacation we planned several skating and tobogganing parties.

Then there was the Sixty-first Convention of Phi Kappa Sigma at Detroit on December 29, 30, 31, which made a thrilling ending for the vacation.

DELTA TAU DELTA

The annual Doc Weiland banquet was held this fall soon after the rushing period closed. This was the first experience of fraternity life the pledges had—as personal guests of Doc Weiland. Many prominent members of the fraternity were there, not only from

Gamma Beta but from many other chapters as well.

The active chapter was a guest of the University of Chicago chapter at a dinner and meeting in November. The members had the opportunity of inspecting the new Gamma Alpha chapter hall at this time.

Gamma Beta announces the pledging of Frank Aste.

SIGMA KAPPA DELTA

Sigma Kappa Delta takes this opportunity to extend, to the faculty and student body at Armour, our heartiest greetings for a happy and prosperous New Year. We suppose all of the students made up their back work which they intended to do over the holidays, and are up to date in school. Somehow or other, though, most of the fellows seemed to fall by the wayside with their resolutions and are just as bad off as before the holidays. Better luck next vacation.

We planned our usual Christmas Dance for December 17, but it failed to be usual in the fact that it was more of a success than any we have had before. I think most of the fellows wish it could be a semi-monthly occurrence, (except for the work connected therewith). But we were well rewarded for our work when Santa came in with his bundle of presents. Ask any fellow or girl who was there what they thought of the whole affair, and see what a description you get.

The members of Sigma Kappa Delta were pretty well separated over the holidays, so things were quiet around the house. But now that school is in full swing again, everybody is buckling down for the exams and final reports of the semester.

PHI PI PHI

After a two weeks' vacation period filled with holiday cheer, every one returned with a great deal of enthusiasm for the final spurt of the semester. However, since the last time we appeared upon these pages quite a number of interesting things have happened.

The annual dance given by our pledges was held at the chapter house on November 26, and certainly showed a great amount of cleverness and originality in its ensemble. This was followed by the smokers of the A. S. M. E. and W. S. F., both held at our house, and finally the alumni smoker which was held at the house on December 16. Many of the alumni were present and the brotherly feeling between the alumni and actives was strengthened considerably. On this same day, we won the inter-fraternity basketball championship, so we had a double celebration.

The following night, December 17, the last social event of the year was held at the house. It was in the form of a dance, and was certainly a fitting farewell party.

SIGMA ALPHA MU

After a very successful season of rushing, Sigma Alpha Mu has added four new men to its roster as pledges. They are all experienced men, having been out of school at work for at least a year at one time or another. We take pride in announcing the pledging of the following men: R. J. Abramson, Leo Bramson, David Kamerlink, and I. G. Katz.

On Friday, November 25, we celebrated the eighteenth anniversary of the fraternity

with a dinner at the La Salle hotel. Many alumni attended this commemoration of the birth of our organization at the College of the City of New York, November 25, 1909.

RHO DELTA RHO

The college year of 1927-28 has started as a banner year in the history of the Rho Delta Rho fraternity. The basketball team came through in their first game on the long end of a 4-3 score but lost their next game. At the present time Captain Michaelson is making plans to take the alumni into camp in order to make up for the drubbing received last year.

Many of the boys have made plans for the holiday season. Boshes and Klein are going on a hunting trip in northern Wisconsin; O. Pinsof is going to Cleveland; H. Yampole is going home to Milwaukee, and the others have various plans, varying from working to sleeping.

Our rushing period has been equally successful. After the numerous smokers, characterizing this season, and much entertainment at the expense of some of the actives, we take great pleasure in announcing the pledging to Rho Delta Rho of the following men: J. Berger, M. Boshes, H. Yampole, M. Moskovitz, and H. Kaynor.

In closing, the alumni, actives, and pledges of the Rho Delta Rho fraternity extend to the faculty, fraternities, and student body our heartiest greetings for a successful and happy new year.

KAPPA DELTA TAU

Though the mid-winter recess is not usually distinguished by social events due to the fact that many students are out of town, and others are working, Kappa Delta Tau fraternity was present with almost full membership at its annual New Year Party, held at the Embassy hotel. Now that the student members have recovered somewhat from the high temperature required to welcome 1928, they are looking forward to the semester exams, confident that the high scholastic standing of the fraternity will be maintained.

COLLEGE NOTES

(Continued from page 58)

TWO MUSICAL CONCERTS PRESENTED

selections. The first was an overture entitled *Queen of Autumn* by Carl Bigge and the second was a medley of popular airs from Balfe's opera *Bohemian Girl*.

Clark and his futurists, Stresses and Strains, topped the climax with *A Night in June*, *Sing Me a Baby Song* and *Blue River*. They were greeted with a Niagara of applause. The crowd was hungry for music and was not satisfied until several encores had been played. George Rezac, their former director, led the encores while Clark wielded his saxophone. George's hectic leading coupled by the futurists' hot splashes of jazz rendered the music irresistible. They just simply had to play more.

Thus ended the first concert of the season. It was voted a tremendous success not only for the manner in which the numbers were presented but also because of the great interest aroused within the student body. Such cooperation will insure, for the future, bigger and better concerts.

Thursday, December 15, the Armour Tech

Musical Clubs gave their annual Christmas program. The program was opened by an introductory speech by Dean Palmer who emphasized the fact that the program would take more than one period. This remark gained much favor with the students. Following the speech the Orchestra played two selections. Their director held the players well under his control, producing fine, appreciated results. The Glee Club, under the direction of Dr. Protheroe, gave two groups of selections, showing again that Armour is exceedingly fortunate in having such a capable director. Selections from the Band and the Stresses and Strains followed and, judging from the applause of the audience, were a great success.

ON Tuesday, December 20, the last day of school prior to the midwinter recess, Dr. Shannon, pastor of Central Church, addressed the student body. Dr. Shannon is a steadfast friend of Armour Institute and is well known to the students, alumni, and faculty of the Institute.

Dr. Shannon opened his talk by commenting upon the cheerful spirit existing every place at the Yuletide Season. He went on to discuss several vivid and interesting personal experiences. The theme of his address was the value of individuality. Dr. Shannon clearly differentiated between individuality and eccentricity. He also pointed out that individuality was the result of long years of preparation.

Dr. Shannon by his apt examples showed that it was always one individual with a strong overpowering individuality that formed the policies of nations and arose in a crisis to lead the people from chaos to order. And similarly in this great industrial age many an engineer with an impressive individuality has led some phase of industry from chaos to order. Dr. Shannon's address was one of the most inspiring ever given at Armour and was thoroughly appreciated by the student body.

THE official opening of the social season at Armour occurred on the evening of November 18 when the senior class gave their informal dance at the Lake Shore Athletic Club. The senior class was present—with the possible exception of a few who seemed to have outgrown their ballroom days. There was also a good representation present from the other classes and a good turnout of alumni. It was very pleasing to see a number of freshmen at this dance and bodes well for the future social functions of the freshman class.

Bob Brummund and his social committee are to be complimented for this splendid dance. With a twinkling of feet, an exchange of greetings, a last dance as only Jack Chapman and his colleagues can play it, a hearty laugh, a clasp of hands, then farewell and the Senior Dance became only a cherished memory.

Now the juniors claim the limelight with their informal dance to be given on the evening of January 13 at the Illinois Women's Athletic Club. Walt Healy and his committee have charge of the arrangements and they feel confident that the hoodoo date will only add to the success of the affair. So if you desire to mix with Armour's elite come to the Junior Dance.

SOCIETIES

It is well for a man to respect his own vocation whatever it is, and to think himself bound to uphold it, and to claim for it the respect it deserves—Charles Dickens

ARMOUR ARCHITECTURAL SOCIETY

At the opening of school this fall, we were very glad to see so many fellow architects return and also to welcome the largest class of freshmen we ever had. Because of this large group, conditions at the Art Institute became crowded and it was necessary to do some planning to arrange for the freshmen.

Shortly after the opening of school the Society held its election of officers. R. B. Chidester was elected president, or as an architect would say, "Sou Massier," and A. W. Sullivan became the secretary-treasurer. The new officers spoke on the purpose of the organization which they outlined as the promotion of cooperation between the classes.

Sophomores and upper classmen are looking forward to the gala day when the freshmen are initiated into the Society. At this time the freshmen must supply all the entertainment and show the rest of the club a grand time. They usually do.

The students at Armour proper have in the past felt that the architects are somewhat separated and are distinct from the school as a whole. We sincerely hope that there may be more spirit of cooperation between the sections and the ideal of both be "Armour, first, last and always."

THE ARMOUR TECH RIFLE CLUB

The Armour Tech Rifle Club was organized soon after this college year began. Several members of the student body who had had military training and practice in rifle marksmanship before they entered Armour were desirous of continuing their range work.

These students came together early at the beginning of the college year with the idea in mind of forming a rifle club. A meeting was held under the sponsorship of Professor Mangold, who later became the faculty advisor of the club. This meeting was well attended and plans were laid for the organization of the new club.

The first official meeting of the newly organized rifle club was held October 27. The following officers were elected at this meeting:

President S. PULASKI
Vice-president W. KERR
Secretary H. MONTGOMERY
Treasurer G. HELLER
Sergeant-at-Arms J. JACOBSON

Mr. S. Janiszewski was appointed Range Officer to serve throughout the year.

The constitution, which had been previously arranged, was read, changed according to popular request, and accepted.

With the aid of our faculty advisor, Professor Mangold, we have been able to secure a very good range near-by, located in the 12th Light Field Artillery Armory at Thirty-fourth Street and Wentworth Avenue. Any two or more members desiring

to fire on the range at any time during the day may do so. Two or more members must be present at one time as a precaution or safety measure.

A rifle match was secured with Parker High School and on December 2, the Armour team consisting of S. Pulaski, G. Kloefer, J. Lodeski, W. Kerr, J. Jacobson, D. Powers, S. Janiszewski and G. Heller went to Parker High and shot their targets on the Parker range. The five highest scores (scores according to above order) counted as the official team score. At this writing, the Parker team has not yet fired their targets, but from the looks of our scores we have a coming team, which, it is hoped, will be second to none.

WORDS are tools for the transmission of thoughts. Thoughts are the result of feelings. The recipe for good writing is—write as you feel, but be sure that you feel right. But before you write you must have an equipment—a literary kit—of mouth-filling, expressive, far-reaching words and phrases.

Through language we touch finger-tips with the noble, the great, the good, the competent, living or dead, and thus are we made brothers to all those who make up the sum-total of civilization.

—Elbert Hubbard.

A return match with Parker High and a match with Crane College has been promised soon after the holidays.

Arrangements have been made to have speakers versed in the technique of rifle marksmanship at some of the meetings in the near future.

THE WRANGLERS

At the first official meeting of the *Wranglers of Armour*, Harry Bates, P. B. I. L., S. D. I. B., Car., was elected master wrangler. With the election over, work was started in full swing. The purpose of the *Wranglers* is to help each man to better understand the work in the civil department. Each civil, upon entering into the spirit of the organization, automatically becomes a full fledged member. We feel that it is only proper to help a brother member in distress, so we do so whenever the opportunity presents itself. Social meetings are held whenever possible, and either bridge or some other form of entertainment is provided. We hope in this way to brighten any of the dull parts of the life at Armour.

WESTERN SOCIETY OF ENGINEERS

Since the last issue of the *Engineer* the W. S. E. has had two lectures and a smoker. The two speakers were Mr. Edgar S. Nethercut, who reviewed Prof. Pupin's book *From Immigrant to Inventor*, and our own Prof. J. R. Griffith, who gave a non-technical talk on the mechanical solution of indeterminate structures. Prof. Griffith used lantern slides to illustrate his talk.

Our fall smoker was held on December 14 at the Phi Pi Phi House. Entertainment was furnished by Edstrand, Petters, and Sadick, who made up the musical part of the program, and by Sidney Cohen, whose humorous stories kept everybody roaring. After the entertainment those who did not play bridge tried their best to disturb the players by singing. With plenty of smokes, eats, and the fine entertainment nothing less than a good time was had by all.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The Armour branch of the American Institute of Electrical Engineers has had some very interesting meetings—the joint meeting with the Armour branch of the A. S. M. E., the student convention of A. I. E. E., the A. I. E. E. smoker and the joint meeting of all the engineering societies, sponsored by A. I. E. E.

On November 18, a joint meeting of A. I. E. E. and A. S. M. E. was held. The "Mechanicals" furnished the lecturers—several students from that department.

A convention was held on November 28, 1927, at the Drake hotel, of the student members of the A. I. E. E. The purpose of this convention was to discuss the problems of conducting the branches of A. I. E. E. at the different schools represented. The schools represented were Armour, Lewis Institute, University of Illinois, University of Wisconsin, Marquette University, University of Minnesota, Rose Polytechnic Institute, Notre Dame, Purdue, and University of Michigan.

Recently Mr. Durgin gave an interesting talk before a joint meeting of the engineering societies, the subject of his talk being, *Standardization Under Hoover*. He outlined the methods which were used to aid the manufacturer to cut production costs and place a better product on the market.

ARMOUR RADIO ASSOCIATION

The Armour Radio Association started the school year with a get-together meeting in which the new men at the Institute were made acquainted with the "old timers" and were told about the A. R. A. and the Institute's amateur station 9WT. The meetings of the A. R. A. will be, insofar as possible held at times when there are no conflicting programs so that all those interested in electrical communication may find opportunity to attend the meetings.

On November 18, Prof. Wilcox gave a talk on *Distributed Capacity of Inductance Coils*. While this meeting was attended by a good portion of radio men, the meeting on December 2, when Frederick Ewald, '26, spoke on *Audio Frequency Amplification* was one of the largest radio meetings held at the Institute. A number of curves were presented by Mr. Ewald to bring out important points in his talk.

A number of licensed operators are available for operation of station 9NT this year. Most of the old operators are back again with the exception of Chief Operator L. F. Pfeder. Harvey H. Dozios has been elected to succeed "Felix" as the Chief "Op."

The station was completely rebuilt during the early part of this semester. A new short wave receiver, which is more effective and neater in design than the double deck set used last year was constructed immediately after the opening of classes. The $\frac{1}{4}$ kw. 40 meter CW transmitter is now replaced by a 150 watt 40 meter transmitter. The new transmitter uses two UX852 Radiotron tubes, rated normally at 75 watts output, and designed particularly for short wave transmission. Although this new transmitter has only been in operation a short time, very favorable reports have been received concerning its operation. An amateur wavemeter has also been added to the equipment at 9NT.

THE TRUSS

The Truss club is having one of its most active and successful years—a house warming party was held on November 17, and it brought together the alumni and the active members in a happy reunion.

After the usual consumption of smokes and refreshments, everyone went home happy.

The crowning event of the semester was a dinner dance held at the Terrace Gardens of the Morrison Hotel on Thursday, December 15. The following men were formally installed as members at this affair: L. C. Dusberger, Val Olshewski, J. V. Phillips, Arthur Reichhold, Philip Reif, Ed. Rutkowski, and Ed. Weitzel.

FLASK AND BEAKER

Flask and Beaker has started its activities of the year with two smokers to which a number of seniors and juniors were invited. Besides playing bridge and smoking big black cigars, those who survived were entertained by a sleight of hand performance given by our most promising magician, James Candlin. Wonderful refreshments were synthesized and served by a most reputable chef, namely, U. G. Naef.

The members of Flask and Beaker have made plans for future activities such as sponsoring a number of A. I. Ch. E. meetings, attending A. C. S. meetings in a group, and holding theatre parties.

Flask and Beaker is not organized with social activities as its major aim, but to grow into a professional organization of the chemical profession. With this view in mind the members are planning the organization's activities to stimulate the interest of the chemical engineering students in that direction.

We take great pleasure in announcing the pledging of: R. U. Brown, W. D. Egan, Henry Fabian, L. A. Krammer, V. F. LaPlana, A. J. Stabovitz, and Robert Young.

ARMOUR TECH MUSICAL CLUBS

The present organization known as the Armour Tech Musical Clubs and composed of members from the various four musical bodies included in its scope, is a result of gradual development over a period of many years, of the interest and love for music among students at the Institute. The first attempt at an organized musical body at Armour was made by Douglas many years ago and was the old Mandolin Club. This gradually expanded into an orchestra of rather doubtful classification, since it was a composite of popular, symphonic and band players. Then the Glee Club was organized, then the band, and finally the baby of the Clubs, the Stress and Strains. With so many different types and kinds of musical institutions at Armour, there was only one way to obtain unified results in the shape of concerts, and general activity at school. Hence the general organization of the clubs involved, into one governing and guiding body composed of all members.

The problem of removing the engineering student's mind from technical subjects has always presented difficulties, and it was one of the intentions of the officers of the Musical Clubs to occasionally divert the attention of the men at school temporarily from the mysteries of stresses and at the same time to help make up as much as possible, the admitted lack of the cultural and esthetic in the present curriculum. The club has gone far in its endeavors. Frequent concerts keep both the student body at large and the members of the musical organizations especially, interested in music at the Institute.

This year there have been two morning or assembly concerts given so far, for the student body only. Sometime in the near future there will be an evening concert with a dance following it, at which we hope to have a considerable outside attendance. This will lead up to the climax of the year, the Home Concert, which we hope to make the most finished and artistic of the season. If the standard continues to improve as it has at the previous concerts we have no doubt of our wish being realized.

It may be of interest especially to the new men to mention that members of Pi Nu Epsilon, the honorary musical fraternity, are chosen from members of the Musical Clubs who have shown by their continued interest and activity in the clubs after two years of more or less apprenticeship, that they are working for something more than a gym credit.

STRESSES AND STRAINS

In accordance with the spirit of expansion present in the musical clubs at Armour this year, the Stresses and Strains have enlarged their instrumentation, although the organization is inherently a comparatively small one.

As most of the students probably know, the Stresses and Strains were organized to provide an outlet which was obtainable in none of the other organizations, for a type of rhythmic music, sometimes degenerating to the level of jazz, at others merely rhythmic arrangements of the classics. Frederic Stock of the Chicago Symphony, says that such music appeals to the feet only, rather than to the spirit or the intellect. The latter part of that statement may be open to discussion, as some of the parts offered by the modern jazz arranger are anything but elementary with respect to time technique and tone.

However, granting its truth, it is certain that such music appeals to the average young man and rather disputes the argument that jazz and popular music will be short lived. There have been many more applications for membership in the Stress and Strains than could be used.

However, as was stated at the beginning of this article, the membership has been increased to about fifteen. This allows a larger and more complete saxophone section, a new addition to the brass choir in the form of a baritone, and the addition of a string bass to help provide the *um-pah*. An extra banjo and a cello complete the new additions. The result is a better balanced and better filled out ensemble.

THE ARMOUR BAND

The lights in the hall dim. Footlights and floodlights flash. A pause and the curtain parts. A figure walks on the stage, bows—taps his baton. A group of men with their instruments poised, alert—tense. A flicker of the stick and from the distance comes the tap—tap—tap of marching men. Louder and louder. A trumpet call—softly ringing—stirring the heart—quickening the pulse. Louder as the music swells until—CRASH!—and the entire band swings into the immortal strains of one of the world's great marches. True, that out in the snow and sleet is the everpresent mud and dirt of Toity-Toit Street; true, that the rumbling of the trains often disturbs the hush and quiet of the hall; and yet the Band has still the power to make the blood flow faster and the nerves tight. More honor than to the leader and men who, working under such disadvantages, used their limited knowledge of nature's harmonies to give pleasure and joy to the rest of the student body.

The concert on December 15 showed even more plainly than the previous one, the improvement in the Band's personnel and instrumentation. Volume, control, shading, rhythm, and tone were far better than in any previous concert. It was the result of work—hard, intensive work on the part of the band and George Rezac, the leader. With this same spirit, we expect the band to develop even greater possibilities and achieve greater triumphs in the remaining concerts of the school year.

ORCHESTRA

As anyone who attended the morning Christmas Concert of the Musical Clubs on December 15, may have noticed, the instrumentation and performance of the Orchestra has been greatly improved since the first concert, even though that was considered an advancement over previous years.

The string section which has never been overly strong, due to lack of numbers, has grown to over double proportions, and a good body of string ensemble which is the base of any symphony orchestra, is now in evidence. The violins are playing with a snap and a sureness never evinced before, and the background provided by the cello and bass sections complete a well balanced string choir. The percussion has been strengthened by the addition of timpani. The weaknesses still present as far as representation of full instrumentation is concerned, is in the woodwind and the brass sections. In the latter, the two trumpets and the French horn division and the baritone do their best to make up in volume at least, the lack of a trombone; but the quality

(Continued on page 76)

ATHLETICS

Phi Pi Phi and Junior Basket-Ball Teams Are Intramural Champions

BASEBALL

Coach Kraft will have his pitchers and catchers start work in the gym, to loosen their arms and generally start things going, the first week in February. All men who have any baseball ability at all are asked to report to him at that time. From then on until the outdoor season starts there will be meetings for skull practice from time to time and general meetings of the team.

Several men were lost through graduation and failure to return to school so that many positions are open.

CROSS COUNTRY AND TRACK

The cross country team finished their season with a net result of five meets lost and none won. Several were close enough to scare the opponents but the reserve material was not quite strong enough to pull through. Captain Phil Deiwert won first in three of the five meets but usually the rest of the team was quite a way back toward the rear. Smith ran fairly well all through the year, usually coming in second of the Tech men. At a meeting of the squad he was elected captain for next fall. Bill Green is deserving of praise and credit for his work in managing the team fall.

Oct. 15—Loyola, 23; Armour, 32, at Loyola. Oct. 22—La Grange won from Armour at Washington Park.

Nov. 12—North Central, 23; Armour, 32, at Washington Park.

Nov. 19—Wheaton College, 27; Armour, 28, at Washington Park.

Nov. 22—Y. M. C. A. College, 21; Armour, 34, at Washington Park.

The track team is now working indoors at the U. of Chicago gym several nights a week. It is planned to have several indoor meets this winter and the men must get out and practice. Coach Loney Staggs is out every night to give his help. Lockers, etc., may be obtained from Green, the assistant manager. It is probable that Armour will enter a team in the I. A. C. meet to be held in February this year and it is hoped that enough half and quarter milers will turn out to send a team to the Illinois Relays in March.

BASKETBALL

The team has been working every night under the direction of Milt Romney in preparation for a very stiff schedule. So far the team has played four games winning two and dropping two. Maybe dropping isn't the correct word, for the Chicago Normal game was almost thrown away. In the first game the Tech outfit won a fast game from the Alumni 30-10, for which several of the old timers came out. Some of the most active were Joey McLaren, Jerry Schmacher, Billy Downes, Sead Kuffel, Max May and several more who did their stuff

(Continued on page 76)

OUR VARSITY CAPTAINS TRACK

Philip S. Deiwert

Deiwert will lead the Tech track and field men this winter and spring. At first sight he does not impress one as the type of a student to care a great deal for athletics; however, one has but to watch some track



Philip Deiwert

meet or cross country race to see Phil in real action.

Deiwert is small in stature and weight but large in the points column at each meet. He was born July 23, 1904, in Greensburg, Indiana, where he went to school, graduating in 1923. After a post graduate course he entered Armour in the fall of 1924 to take the Fire Protection Engineering course in which he received a scholarship. With no previous experience in athletics, he worked with the track team in the spring and received honorable mention for his work from former Coach Phalen. Since that time, he has run with the cross country team three years, serving as captain this past year. He has been awarded two major letters in track and at the present time holds the school record in both the mile and the half mile. He has twice made the Illinois Relay team, being one of the four who won medals last year. He has also found time to put in on the publications as an assistant on the business staff of the *Cycle*. Phil is a senior, a member of the Sigma Kappa Delta fraternity, the Honor A society, and the Press Club.

A former Armour student has won considerable attention by his athletic prowess. The story is told on page 45.

INTERCLASS BASKETBALL

The juniors, under the management of Bill Berry, won the school basketball championship this year. In the first game they took the seniors off to the tune 16 to 12 and later took a close game from the sopho-



Junior class basketball team. Back row—Manz, Ewing, Dawson, Yount, Berry (mgr.). Front—Fee, Steller, Newstrom.

mores 18-15. The sophs had previously trounced the frosh in a rather one sided game. As a reward for their work the class gave nine black sweaters with yellow and black '29s to the team. The team was composed of Fee, Newstrom, Ewing, Manz, Dawson, Cramer, Steller, Gedelman, Quinby and Yount.

INTERFRATERNITY BASKETBALL

The Phi Pi Phi team was again victorious in the annual scrap between the fraternities held in December. It begins to look as though they are determined to retain possession of the title as they have not lost it in some nine years. The games were run off this year under the supervision of A. H. Everly, who is deserving of a great deal of praise for his management of the series. All of the games with the exception of the final were held in the Tech gym while the final was held at the Armory. The games were played in a very good manner for the most part, with very little roughness and few fouls. We can remember back to the times when there was a great deal of bad blood between the houses but this seems to be a thing of the past—for which we are thankful. It is a fine thing for the houses to get together in such a friendly manner and leave in the same mood. It has been the custom in the past to pick an "All-star" team but inasmuch as we did not see all the games we are not able to do this. The games were run off in an elimination series with some of the teams drawing byes and so arranged that the winner must win at least three games to cop the cup. The results follow:

First Round

Theta Xi 9

(Continued on page 70)

THE ROOT OF TECH.

IT'S "SQUARE."

A Man Is an Animal that Writes—Homer

EDITORIAL (SOME MORE)

*"I think there should be two of me;
A living soul, a Ph. D.—"*

WALTER HENDRICKS.

Coming from one of our faculty, this little couplet seems apropos particularly with reference to the Armour student. While not exactly aiming at the acquisition of a Ph. D. degree, most of us seem to have allowed ourselves into the musty, and dour stodginess that seems so essential to the manner of our dignified philosophers. Eating, drinking, and living in terms of integrals, B.t.u.'s, valence, megohms, or what have you, has its reward, but a living, laughing personality is not the result. You've already guessed it, we write this to fill space, and evade the task of creating new jokes, or digging up old ones, on engineering. Frankly though, we want your help and we know that if you'll only keep alert when one of the pros sneaks across a fast one, as even pros are apt to do every decade or so, the garnering of humorous gems for this page will be made so much more easy—not only that, but a large list of contributors is sure to insure spice and variety. Well—get your spoon—here is some more Cream of Armour Wit.

"ENT YOU SHOULD SEE WOT I GOT, ABE."

The north wind do blow,
There's a suggestion of snow,
Christmas has come and went.

Ent to remember it from the event,
I possess some ties I resent.
Ent a box of cindy hard as cement.
Some home-brew not efen begun to ferment,
A pair of suspenders, magniloquent,
Ent a bottle or two of ten cent scent.
One unclassifiable implement,
A shirt what she fit like a tent,
Socks what should raise a temperament,
Ent a copy yet from the new testament,
Ent somebody's photograph—iss a compliment?

One dried up fruit cake for nourishment,
Two insurance policies, one eccident.
Ent bills—oy oy—bills—all imminent,
Ent first from January it comes it the rent.
A sub-poena too, what might mean imprisonment,

From a traffic cop what got insolent,
Even yet, I should plead innocent.

Oy—the north wind do blow,
There's a suggestion of snow,
Ain't I glad Christmas has went!
—the nose full from nickels.

AFTERTHOUGHT

WALTER HENDRICKS

*Nearer it was to moulting than to
nesting.
Though not so far from nesting that
parent swallows
Had turned their off-spring off with
flying certificates
As flying instructors turn loose human
fledglings
When they have learned to feel their
way through air.*

*But surely past the time for gathering
feathers
To mix with clay for building pur-
poses!*

*And yet I saw one of the parent swal-
lows,
Between policeman's duties of keeping
the young
From resting after flights, to keep
them moving,
Sweep swiftly down and snatch a pret-
ty feather
A homing dove let go in flying over.*

*I wondered was it merely a flying ex-
hibition?
And would it let it go for the young
to shoot at?
Or was it some attachment for a
feather
The swallow felt in having done with
feathers,
The way a stamp collector growing up
from boyhood
Gives up his habit when he finds his
man,*

*Yet, almost against his will, will save
a specimen
When one comes on a letter from
some foreign country.
Perhaps it's in us, like the grain in
wood.*

*And I wondered if, while accepting
what awaits us,
We'll not be looking out for bits of
life
To pick up once again, since once we
loved it!*

VERSE WITH BOOK.

A poet defined,
An enlightened mind,
As one which read—
and learned.

Yet do we not find,
books—
embossed and gilt,
in pretentious manner,
quite devoid of song,
instruction or pleasure—why—
they might as well,
be typed in pi.

Still again—some Master's work,
ill-housed in battered tome,
seeming to cry,
for a better home?

Then that supreme delight,
Tales, that sing,
and thrill—
'tween covers that speak,
of the binder's best skill—
paper—caressing the fingers, until,
the last page turned.

But the greatest of joy,
or the greatest of sorrow—
we find, when we have read aright,
whether in whole or in part—
that strangest, most beautiful book,
—a true friend's heart.

—ARAMIS.

TIME TO SPARE

"Ain't you one of them guys what drops
their tools and beats it as soon as the whistle
blows?"

"Not me! After I put my tools away, I
usually wait around about five minutes for
the whistle!"

MEDICINE.

"They'd never give you chloroform."

"Why?"

"They'd never know when you were un-
conscious."

RED HOT PAPA.

"Did you notice what time the master re-
turned last night, Martha?"

"No, I did not, mum . . . But at 7:30
this morning his shoes was still warm!"

WE'LL BITE!

A sign was posted on the door of the
dean's office the other day which read:

Back in half an hour.

A few minutes later some wag had added
a line:

What for?

Statistics gathered from the observation of
the application of men to their studies show
these results:

Men who resolved to study during	
Christmas holidays	100%
Men who studied during Christmas	
holidays	0%

THE BRAINSTORM

Torn from the Mech. Lab. report of a senior fire protect., and thrown "as is" into our sanctum by a prof with a sense of humor, the accompanying drawing purports to illustrate what in engineering parlance is called a Wachs Steam Engine—see living specimen in Mech. Lab. Upon investigation the quality of the paper used at once suggested the T-X house. (The watermark on the paper shows it's from the same hotel as the silverware.) Kent Parker can't letter that well, and upon further thought we remember that Babe Henry can't draw an ellipse, so that lets them out. It couldn't be Red Miller, because no proud daddy would even think of a report until the first six months of celebration were past. However, we do wish the artist would step forward and be recognized. The *Cycle* staff is in need of a clever window washer.

The artist seems to have been fortunate enough to study under that great master, Goldberg, the famous "mopse operated goboon cleaner" inventor-cartoonist. Upon inspection the "frame" seems to supply steam to a box called the "steam cylinder." By using a plumber's plunger for a piston the necessity of a crosshead is eliminated. It is evident, also, that the "connecting rod" is of glass, or some similar transparent material, and is attached in some mysterious fashion to a crank of wafer-like thickness. What happens when the "connecting rod" has to pass the "shaft" is highly problematical. The "pulley for the Prony Brake" is wrapped with string (of good quality). It seems that in this modern design a flywheel, an eccentric, or a valve, are considered superfluous.

Immediately above the indicated "base" there can be seen two parts which puzzled us for quite a while. When suddenly we remembered that in the latest Yellowkub designs the springs are set in rubber shackle blocks, and knew that any pounding of the rod would thus be taken up by these ingeniously placed shock absorbers. Painting the engine Yellow of course must give an increase in efficiency. Recommendation of the artistic designer has been made for the degree of B. B. S.—burnt by steam—but personally we think that troduction isn't quite so messy.

REMINDED

"The storm burst upon us so suddenly and violently that we had no warning of its approach," said the tornado victim, relating his experience to a friend. "In an instant the house was demolished and scattered to the four winds. How I escaped being torn to pieces I do not know! We—"

"G-good gracious!" exclaimed Mr. Meeke, jumping to his feet. "That reminds me! I almost forgot to post a letter for my wife!"

PILLOW! PILLOW!

"Oh, does your girl skate too?"

"Yawns. Off and on."

"Funny; I ask her where she did most of her skatin', and she ups and whams me."

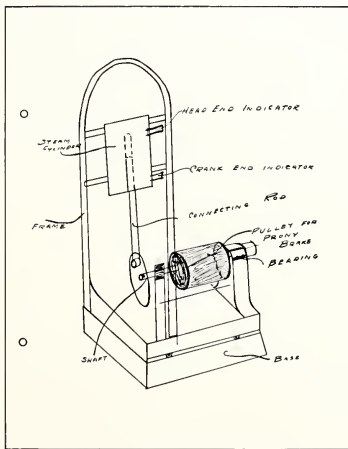
NAME HIM AND HAVE HIM

Our daily papers have recently been filled with requests to name a horse, or a dog, or a pet goldfish; the one naming him to win him, have and to hold.

Well, we're right in the money now boys. We've got a baby alligator, and baby needs a name and a home. We have already temporarily named him Whispering Willie, but surely someone can find Willie a better name and a home.

Willie was not left on our doorstep, he came parcel post, in a neat little crate full of air holes. Willie is that peculiar smelly box Stanley has been wet-nursing lately.

We do not know who sent us Willie, the box was sent from Madison, and presumably he was picked up in "Wild Life Refuge,"



A senior fire protect's conception of a Wachs Steam Engine. For the gruesome details, refer to the first column of this page.

that famous shady lane up there. Well now—who wants Willie? Name him, and have him.

The Old Spinster—"Has the canary had its bath yet?"

The Maid—"Yes, he has, mum. You can come in now.—*Virginia Journal*.

WE AGREE!

"Is an editor a man who puts things in the magazine?"

"No, you fool, an editor is a man who keeps things out of the magazine."

NOT NEEDED

Merchant—"Before I engage you, you will have to pass an intelligence test."

Girl Candidate—"Intelligence test? Why, the advertisement said you wanted a stenographer."

THE ARMOUR ENGINEER

March, 1917

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Chairman.....R. H. Earle

Secretary.....H. A. Kleinman

Treasurer.....W. T. Watts

The meeting of February 6, 1917, devoted to a demonstration of radio phenomena, was conducted by Messrs. Stevers and Mathews. A complete receiving station was installed in Science Hall, and signals were received from various government and private stations of the country. The weather report from Arlington, Va., was heard about nine o'clock, and messages from ships on the Atlantic Ocean were picked up at various times during the evening.

The feature of the evening, however, was the receipt of music sent by Mr. Howard of Maywood by prearrangement. Various phonograph records were heard with remarkable clarity considering the atmospheric conditions at the time.

Mr. Stevers gave a lecture on the development of the wireless apparatus, and illustrated his talk with slides showing various pieces of apparatus and some noted stations. Mr. Mathews had charge of the apparatus and conducted the experimental part of the demonstration. The messages were audible to everyone in the room by means of a microphone and loud-speaking receiver.

We wish to thank these two men for this interesting and educational demonstration. We also extend our hearty thanks to Mr. Howard who loaned apparatus and spent his time in sending music through twenty miles of space for our entertainment.

H. A. Kleinman.

"Hear no evil. See no evil. Speak no evil." And you'll never be a success at a tea party.

Marmalade—That yellow, sweetish substance found on toast, neckties, and piano keys.

THERE AIN'T NO SANDY CLAUS

On one of those terribly crowded streets during the holiday shopping frenzy a little boy was seen crying and wailing as if he were lost. An Arabian probably profitably engaged in the "soot and garment" trade gingers stepped up to the crying lad and asked if he were lost. To which the lad answered with a very hasty affirmative, "Iss dere a reward for you, mite boy?" queried the Arabian. The lad tearfully replied, "No, I'm lost." "Well," countered the big garment man, "you is still lost." And with a gentle shrug of his shoulders he walked off.

AIN'T THAT SWEET?

As I was coming down the street I met a man from St. Ives. "Watcha got under that arm?" says I. "Sugar for my coffee," says he. "Watcha got under t' other arm?" "Sugar for my tea," says the lad, coyly. Well, you may imagine how my ire was up, so by and large, I gave him a couple lumps for his cocoa. Chortle. Chortle.

—Amherst Lord Jeff.



To the Daniel Boone in every man!

IT is still the day of the trail blazer. In the telephone industry pioneers are cutting new paths in the knowledge of their art.

This industry is continually on the threshold of new ideas, with each development opening up a vista for its explorers to track down.

Their activity will be as engineers in laboratory research and

plant operation, but also in supervisory and executive positions — planning the course of activity for groups of men and carrying the burdens of administration.

The responsibility and opportunity of management take on an increasing importance in an industry such as this, where forward-looking leadership must point the way to ever better public service.

Please mention The Armour Engineer

Today telephone cable, carrying hundreds of circuits, crosses Daniel Boone country on the way from New York to Chicago



The alloy of lead and antimony which forms the rugged water-tight covering of this cable is but one development among many made in Bell Telephone Laboratories.

In actually building this line, Daniel Boones of telephony blazed a trail of poles and heavy cable through dense woods, over rivers and across five ranges of mountains.



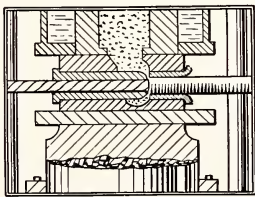
Trail blazing in cable manufacture at Western Electric

ALL the trail blazing and pioneering work of telephony is not done alone in laboratory and field. Western Electric, as manufacturer for the Bell system since 1882, has done its share — for example in the cable shop, helping to make possible the New York to Chicago cable.

The lead press illustrates the practice of the engineers of this company continually to work out new types of machinery that will improve the quality of output and at the same time increase production. This ingenious machine turns out thousands of miles of lead-

covered cable every year, with an efficiency far greater than was ever possible under the old laborious hand methods. It is the point of view which seeks the better way that enables Western Electric to supply the nation's ever increasing telephone demands.

Western Electric engineers prepared for present needs long ago, and right now they are getting ready for the future. The men of this company are pioneers — opening up new country in manufacturing methods and blazing the trail to more economical yet more efficient production.



The lead sheathing press revolutionized the cable covering process.

BELL SYSTEM

A nation-wide system of 18,000,000 inter-connecting telephones



"OUR PIONEERING WORK HAS JUST BEGUN"
Please mention *The Armour Engineer*

houses.

3—Fire division walls.

4—Elevators, stairways, dumbwaiters and corridor enclosures.

5—Light wells, pipe chases, heating and ventilating decks.

6—Coverings for columns, beams, girders, trusses, and other steel members requiring fireproofing.

These tile are laid with gypsum mortar. A 3x12x30 in. hollow partition tile weighs 9.9 lbs. per square foot and when plastered on both sides with $\frac{1}{2}$ -in. of gypsum plaster weighs 15.9 lbs.

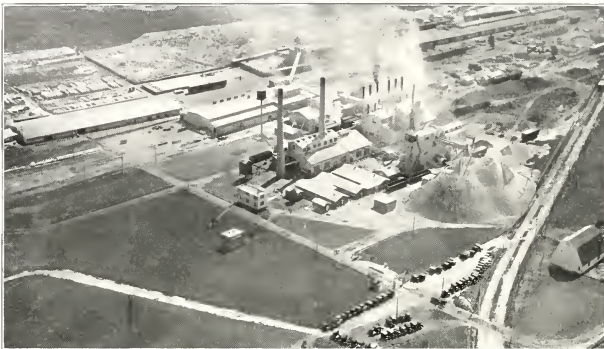
It is a well known fact, that all materials will fail in fire if the temperature is high enough, and the duration long enough. The method of failure varies in the different types of materials, gypsum failing by calcination. Gypsum behaves in a fire unlike any other building material, because it has a characteristic inherent in no other material. It provides its own "sprinkler system." When a fire strikes a gypsum wall, calcination begins, that is, the water of crystallization chemically combined in the gypsum is driven off.

The depth of the calcination is not proportional to the temperature or the duration of the fire, but calcination proceeds more and more slowly as time increases. As the water evaporates, it leaves the calcined portion on the surface which adheres tenaciously to the remainder of the material, thus providing a barrier or retarder to the fire. Where calcination is in progress, the water is being driven off, leaving a wet, steamy mass which acts as a blanket to the uncalcined portion of the material. The big advantage in gypsum as a fire-proof medium is that, as long as there is any water of crystallization left in the material, the temperature on the unexposed side cannot exceed 212 degrees Fahrenheit, the boiling point of water, regardless of the temperature on the exposed side.

Structural steel starts to lose strength at about 600 degrees Fahrenheit and at 1000 degrees Fahrenheit practically 50 per cent is lost. Using a 2-in. solid tile for fireproofing, in an exposure of 1900 degrees Fahrenheit of continuous heat for a duration of two hours, the gypsum tile will not permit the temperature of this steel to attain a temperature of more than 212 degrees Fahrenheit. The beam and column coverings consist of a

shoe-tile which fits closely over the lower flanges of the beams with sides of larger units. Gypsum does not expand or contract to cause failure when exposed to high temperatures. The economical feature of gypsum in fire-proof construction is its light weight, the material being lighter than any

with the sides tight together and span from purlin to purlin. The joints are grouted in only at the top. Long span channel tile are used to advantage on public buildings, warehouses, schools, etc., where a high degree of insulation is not essential. Long span hollow tile are used for maximum insulation in



Airplane view of the Ft. Dodge, Iowa, plant of the U. S. Gypsum Co. In this region, a uniform vein of gypsum rock, 14 feet thick, is found about 30 feet below the surface. This rock is now mined, but is to be quarried in the future.

other building material. The use of gypsum products in the Statler Hotel at Cleveland made a saving in dead load in excess of 2,400 tons, and in the Cleveland Athletic Club building a saving of 3,700 tons. This dead load saving means a decrease in cross sectional area in beams, girders and columns.

Roof tile are made of extra dense structural gypsum, reinforced with electrically welded galvanized steel mats and rods, so designed as to carry the full required roof load. Gypsum has a density of 75 lbs. per cubic foot as compared to 145 lbs. for concrete. The tile are factory moulded and kiln dried. Gypsum roof tile are divided into two general classes which are termed

short and long span. The short span tile are 12x30 in. face dimensions, 3 in. solid and $3\frac{1}{2}$ and 4 in. hollow. These are placed directly on tee irons, sub-purlins, light rails or channels, spaced 30 $\frac{1}{2}$ in. on centers and grouted in only at the top with gypsum mortar. These tile are especially adapted for curved roofs, hip and valley construction or any other unusual conditions requiring careful fitting and cutting. Long span tile are made 18 in. wide, either channel section or hollow, 5 or 6 in. deep, in lengths from 4 ft. to 6 ft.

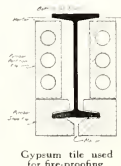
They are laid on the steel work

industrial buildings. Both the channel and hollow types are furnished matched to fit over purlin flanges or are made with lap joints. Gypsum roof tile are light in weight, low in first cost, and the maintenance is practically nothing. They can be laid at all seasons of the year. The material is a very effective barrier to the passage of heat, giving a saving in first cost of heating equipment and fuel. Built up roof coverings of asphalt or tar and gravel and all types of ornamental roofs can be applied directly to the tile.

Reinforced concrete floor construction includes the use of floor voids. These are accurately spaced on form lumber to secure the exact joist widths, the reinforcing placed, and then the concrete poured in place. Gypsum voids are cast in steel moulds of dense calcined gypsum in sizes 12x30 in. of depths, 3, 4, 5 and 6 in. and in sizes 19x18 in. long, in depths of 6, 8, 10 and 12 in. Spans up to 30 feet are possible using gypsum voids where the floor loads are light. With this type of void, less form lumber is used, a uniform plastering base is provided, a good sound deadener, an efficient insulator secured as well as an effective fire stop. These tile weigh 26 pounds per lineal foot for the 6x18x19 in. size.

Load bearing tile are made of the same material as roof and floor tile.

(Continued on page 72)





In St. Louis, the majestic Southwestern Bell Telephone Building (Mauran, Russell & Crowell, Architects), is also equipped with Mississippi Polished Wire Glass. Every window above the ground floor has Mississippi protection. Added recognition for the recognized standard in Wire Glass.

"MISSISSIPPI" WIRE GLASS

MISSISSIPPI WIRE GLASS COMPANY, 220 Fifth Ave., NEW YORK
CHICAGO ST. LOUIS

Armour Institute of Technology Chicago



The College of Engineering Offers Courses in

ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING
CIVIL ENGINEERING
FIRE PROTECTION ENGINEERING
CHEMICAL ENGINEERING
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*These courses are each four years in length
and lead to the degree of Bachelor of Science*

COMPLETELY EQUIPPED SHOPS
AND LABORATORIES



The Institute Bulletins

Will be Sent on Application

ATHLETICS

(Continued from page 63)

INTERFRATERNITY BASKETBALL

Triangle	17
Phi Kappa Sigma.....	13
Sigma Alpha Mu.....	3

(All other teams byes)

Second Round

Triangle	14
Phi Kappa Sigma.....	16
Delta Tau Delta.....	17
Beta Psi	15
Phi Pi Phi.....	19
Sigma Kappa Delta.....	10
Rho Delta Rho.....	4
Kappa Delta Tau.....	3

Third Round

Phi Kappa Sigma.....	8
Delta Tau Delta.....	12
Phi Pi Phi.....	25
Rho Delta Rho.....	13

Final Game

Phi Pi Phi.....	12
Delta Tau Delta.....	6

ALUMNI NEWS

(Continued from page 55)

couple of weeks in late September. During Fire Prevention Week, if your radio was in good trim and properly tuned you may have heard his cheery voice from station KWCR, on the subject of *Fire Prevention*.

Met John Plocar, '21, at the Chicago, Purdue football game. Jack introduced me to his fair friend and after inquiring as to their pleasure on the progress of the game thought it best to move along. Jack reports that his brother Charles, '26, has been over in France with the American Legion. No doubt there are a lot of us who would like to have made the trip with Chuck and the second A. E. F. He should have many good stories of his trip.

Herb Hoff, '26, has decided that volts and ohms are not all-interesting. In consequence of this decision, he has undertaken the study of law at Chicago Kent College. Maybe the position of Chief Justice of the police court of La Grange will pay a better salary and prove more interesting work. In any event we wish him good luck.

CHARLES W. HILLS

CHARLES W. HILLS, Jr.

CHARLES W. HILLS

PATENT, TRADE MARK, COPYRIGHT
AND UNFAIR COMPETITION LAW

1523-38 MONADNOCK BUILDING
CHICAGO

Cable Address Hillsford, Chicago

Telephone, Harrison 6150

A Star Ham to Us, is Something You Are Going to Eat

MEAT is the most important item in the daily diet. Millions of homes look to thousands of retail meat dealers every day to supply this necessary food. These in turn look to Armour and Company as their source of supply—which never fails.

Back of this picture is another—a score of huge packing plants strategically placed to best serve consumers of meat and producers of livestock—500 branch houses bringing daily supplies close to daily markets—1500 refrigerator cars leaving these eighteen plants for these 500 branch houses every day—60,000 employees upholding the Armour standard—“Armour on a food product is an assurance of quality”—Thousands of farmers and ranchers producing annually fifteen million head of livestock which Armour and Company turn into food—and for which they pay the raisers hundreds of millions of dollars on delivery.

And back of this, another picture—the Armour Kitchen in Chicago—the point of contact between you and your home, the ranchers and farmers, the buyers, dressers and processors of meat.

Here under the direction of domestic science experts is determined for Armour what you and your folks demand. From here is enforced every step in preparation that must be observed so that every Star Ham is a delight when it reaches your table.

For sixty years Armour and Company have been perfecting methods to safeguard the meat supply of the nation. Star Ham is but one of the quality products that has established Armour and Company's reputation among the world's leading provisioners.

A R M O U R A N D C O M P A N Y • C H I C A G O

We Never Close

Meet Me
at
the
Finest Place
to
EAT

Bauer's

Restaurant

202-4 East 31st St.
CHICAGO

Phone Calumet 4723

USES OF GYPSUM

(Continued from page 68)

They conform to the accepted sizes of other units—the 6x8x16 in. tile for one-story houses and garages and an 8x8x16 in. tile for two-story dwellings. These tiles are light in weight—22 lbs. for the 6 in. and 28 lbs. for the 8 in. size, and have a crushing strength of 1000 lbs. per square inch over the gross area. They can be sawed or cut with a trowel and are laid up with gypsum mortar. The outside of the wall is covered with a heavy building paper for waterproofing and the standard wall finishes such as stucco, brick or stone veneer, or siding can be applied.

Poured in place gypsum floors and roofs are of two types, the monolithic and systems similar to the Sheetrock Pyrofill construction. The first type is designed according to the suspension bridge formula and is adaptable for either floors or roofs. Forms are used as in concrete construction, and reinforcement provided by galvanized steel cables of two strands of twisted No. 12 wire, spaced to carry the entire slab load. These cables are securely anchored at both ends of bays and brought to uniform tension between the purlins by the use of deflection rods. The gypsum acts as a filler, the steel taking all the stress in tension. The second type which is especially used for roofs consists of a reinforced gypsum slab poured on permanent gypsum board forms. Boards 3/4-in. thick, in lengths equal to the main purlin spacing are shored with two to three strips per length and are supported at the bottom flanges of light rail or tee subpurlins spaced 32 1/2 in. on centers and clipped to the roof purlins. Reinforcing mats are placed over the subpurlins and the boards. The gypsum mix is poured to the proper thickness, screened and trowled ready for the roofing. This type of construction weighs 50 lbs. per cubic foot. Poured

gypsum can be placed during freezing weather. A recent interesting job was that of the new Dodge Brothers' plant at Detroit, where 500,000 square feet of gypsum roof was placed in approximately thirty working days during the latter part of January and the first part of February. In mixing and working gypsum, heat is given off, which with a closely regulated quick set enables the slab to take its set before freezing.

Fireproof insulating materials made of gypsum set new standards in building insulation. There are two types—an expanded gypsum poured in place and a dry flaky fill. Confined air spaces in both types, give extremely high insulating value. The expanded gypsum mix consists of a calcined gypsum base and chemicals, which mix when added to water expands to three or four times its original bulk. Dead air cells are surrounded by gypsum which itself is a low conductor of heat. The Bureau of Standards gives the following conductivity value in B. t. u.'s per hour per square foot per degree difference in temperature per inch of thickness of .44 and for a material having a density of thirty pounds, a value of 1.00. For insulation for ceilings and walls, the 12 lb. material is used. Where high compressional value is required the 30 lb. material is used. One ton of the 12 lb. material will cover 2,000 sq. ft. 1 in. thick and one ton of the 30 lb. material covers 800 sq. ft. 1 in. thick.

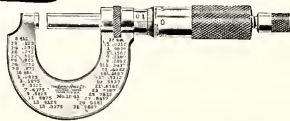
The dry fill is a fluffy gypsum product which has a very high insulating value, and will not burn or decompose and does not harbor vermin. At a density of 24 lbs. it has a conductivity value of .475. It is used as insulation against heat and cold in buildings as floor and ceiling fill. The peculiar properties of the material also make it a good sound deadener. In study-

(Continued on page 74)



Send for
Catalogue No. 11—Tapes and Rules
Catalogue No. 5—Tools

LUFKIN TOOLS
SUPERIOR IN QUALITY AND DESIGN
Winning Their Way to the High Position Held by
LUFKIN TAPES & RULES



THE LUFKIN RULE CO.
SAGINAW, MICH.
New York

Please mention The Armour Engineer



Where Bearings Never had a Chance

In steel mills, in cement mills and in a few other places there are bearing jobs where the loads go beyond a million pounds! Here the trend to Timken Tapered Roller Bearings is even more marked than it is in general.

Timken Bearings are delivering their usual continuous, money-saving service on jobs which never allowed any other type of bearing more than a bare chance for life.

Aside from the maintenance savings, insurance against shutdown, and improvement in product, the power savings on Timken installations fre-

quently run as high as 35%. Cases are on record where 60% of power has been saved. And the cost of lubrication drops to a small fraction of what it once was.

No wonder the importance of Timken Bearings transcends the mere technicalities of "anti-friction." Timken Bearings have become a vital economic factor in the Industries.

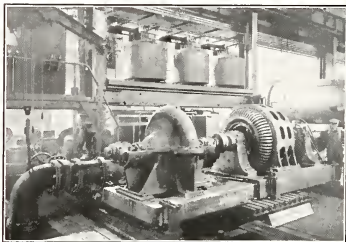
As an engineer you will have more and more to do with the application of Timken Bearings. We shall be glad to send you interesting and valuable matter about them.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS



Please mention The Armour Engineer



TESTING

Insures our Centrifugal Pumps will meet their rated conditions

This assurance is an important consideration in the value of any pumping unit. The customer is further safeguarded by our building both pumps and motors and guaranteeing the unit as whole.

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.
Power, Electrical, and Industrial Machinery

USES OF GYPSUM

(Continued from page 72)

relative efficiencies, analysis has shown that they should be compared on the basis of the insulating value per dollar invested.

The industrial uses can be classed as fillers, moulding purposes and for chemical uses. Gypsum is used as a filler in the following materials: Insecticides, crayons, dentrifices, cotton and lace goods, used with asbestos as pipe and boiler coverings, safe cabinet filler, paints and calcimine, paper, playing cards, corn-cob pipes, face powders, shoe dressing, dry battery filler, etc.

Among the many uses of gypsum for moulding purposes the plate glass industry use a large amount of this material for setting plate glass in place during the grinding and polishing. The pottery industry purchases a large quantity of the low consistency dense gypsum for making pottery moulds. Other uses are for marble setting, metal casting, moulds for rubber stamps, and moulds for phonograph records.

Chemically gypsum is used in the manufacture of sulphuric acid and as a retarder in the manufacture of Portland cement. Other uses include gypsum for the recovery of ammonia from liquors, in brewers salt, for oil filtration of linseed and petroleum oils, in yeast foods, and for drying various commodities such as rice.

Land plaster or agricultural gypsum is made by grinding gypsum rock extremely fine. It supplies sulphur in the sulphate form to the soil. Calcium, nitrogen and phosphorus are supplied directly or indirectly with other material. The gypsum reserves nitrogen in manure and when used in combination with ground rock phosphate, it supplies an economical substitute for acid phosphates.

WIRE

automobile and airplane wires, electrical wires, submarine cables, bridge-building cables, wire rope, telegraph and telephone wire, radio wire, round wire, welding

wire, flat wire, star-shaped and all different kinds of shapes of wire, sheet wire, piano wire, pipe organ wire, wire hoops, barbed wire, woven wire fences, wire gates, wire fence posts, trolley wire and rail bonds, poultry netting, wire springs, concrete reinforcing wire mesh, nails, staples, tacks, spikes, bale ties, steel wire strips, wire-rope aerial tramways. Illustrated story of how steel and wire is made, also illustrated books describing uses of all the above wires sent free.

AMERICAN STEEL & WIRE COMPANY

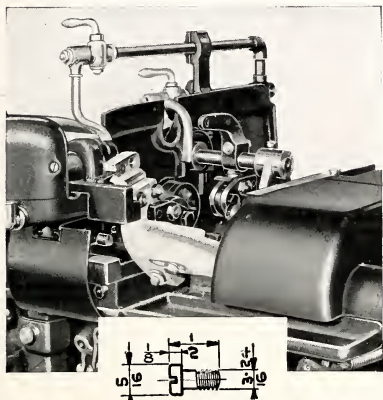
Sales Offices

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A COMPLETE SCREW EVERY SECOND



THIS High Speed Automatic Screw Threading Machine, one of the latest developed by Brown & Sharpe Screw Machine Engineers, produces a complete brass screw every second.

The effect of such rapid production is to lower manufacturing costs. As a rule, this saving is passed down the line to you.

Thus the mystery—how a manufacturer can offer better quality at the same or lower cost—is explained. Lower costs made possible by modern Milling, Grinding, Gear Cutting, and Screw Machines are largely responsible,—and over 100 different types and sizes of these are made by Brown & Sharpe.

BROWN & SHARPE

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Steel Sheets that Resist Rust!

The destructive enemy of sheet metal is *rust*. It is successfully combated by the use of protective coatings, or by scientific alloying to resist corrosion. Well made steel alloyed with Copper gives maximum endurance. Insist upon

KEYSTONE Rust-Resisting Copper Steel Sheets

Black and Galvanized



Keystone Copper Steel gives superior service for roofing, siding, gutters, spouting, culverts, flumes, tanks, and all uses to which sheet metal is adapted—above or below the ground. Our booklet *Facts* tells you why. We manufacture American Bessemer, American Open Hearth, and Keystone Copper Steel Sheets and Tin Plates.

Black Sheets for all purposes
Keystone Copper Steel Sheets
Apollo Best Bloom Galvanized Sheets
Apollo-Keystone Galvanized Sheets
Culvert, Flume, and Tank Stock
Corrugated Sheets
Formed Roofing and Siding Products
Automobile Sheets—all grades
Electrical Sheets, Special Sheets
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SOCIETIES (Continued from page 62) ORCHESTRA

and register of this instrument are undeniably missed in certain passages. As for the woodwinds, a few reeds represented by clarinets and bassoon can scarcely be expected to fill the loss of flutes and oboe and some of the less common reed instruments. The best we can do is to try to fill the void with saxophones although the quality of tone is vastly different. On the whole, however, the orchestra is very well balanced this year.

At the beginning of the year, George Minnberger was more or less on probation as a conductor. That he could run all the scales fluently on his clarinet was well known from his work in the band, but as a leader he still had his name to make. He has undoubtedly qualified. Minne has a sure decisive manner of conducting which lends confidence to his men and which is reflected in their playing. That he has had considerable previous experience is easily seen. We wish him all the luck in the world in improving the organization as much this semester as he did last. If he does, he will certainly leave a rich legacy to his successor.

FIRE PROTECTION ENGINEERING SOCIETY

The Fire Protection Engineering Society has been extremely fortunate in securing speakers for the semi-monthly meetings. The quality of the programs is reflected in the attendance. The Physics Lecture Room has been filled.

We were all more or less familiar with the Chicago Board of Fire Underwriters,

but came to the realization that there were many things we didn't know when Mr. Ernest Palmer, manager of the Board, spoke to us about it.

Our next speaker was Mr. Victor H. Tonsley, chief of the Electrical Inspection Bureau of the City of Chicago. He told us about various cases of electrical fires and hazards to life and property.

Mr. Garrett B. James spoke to us on the subject of *Foam Extinguishing Methods*. We learned something about the Underwriter's Laboratories' label and inspection service in manufacturing industries when Mr. M. M. Brandon, who is chief inspector of this department, spoke to us.

One of the fire hazards which has recently developed is that of pyroxylin lacquers. These are now being used in the manufacture of automobiles, furniture, and numerous other products. Considerable loss has been caused by fires originated by their presence. This hazard was discussed by Mr. H. G. Jordan, engineer of the Western Factory Association.

The life of a "fire-protect" is not all hazards, however, as the smoker at the Theta Xi house on January 12 proved. We were pleased with the loyalty of the underclassmen.

ATHLETICS

(Continued from page 63)

BASKETBALL

"back when," Otto Kuehn, unable to play due to his injured hand, managed the team for the Alumni.

The team traveled to South Bend to engage the strong Notre Dame gang on December 5 but lost 37-14.

The next game was the first real home game for Tech. They met and defeated Crane College at the Armour 28-17. Crane started out strong and led 4 to 0. After a few minutes they put in their first team. They held the lead till the half when the score was 12 to 9. In the second half the Engineers came back with a rush and won the game by a good margin. One of the high lights of this game was the five consecutive free throws of King Simpson made in the latter part of the game. Fee, a new man on the team this year, played a fine game at forward.

On December 19 the boys went out to Chicago Normal to lose a ragged game by 30-14.

The team has new suits for both the home and trip games. Their traveling jerseys are white and the home suits are yellow with yellow numbers of a different shade. They also have new sweat shirts this year. The schedule for the entire year follows:

- Nov. 29—Alumni at Armour.
- Dec. 5—Notre Dame at South Bend.
- Dec. 13—Crane College at Armour.
- Dec. 19—Chicago Normal College at Chicago Normal.
- Jan. 7—Wheaton College at Wheaton.
- Jan. 11—Lake Forest College at Lake Forest.
- Jan. 14—N. I. S. T. College at DeKalb.
- Jan. 19—Y. M. C. A. College at Armour.
- Jan. 27—Michigan State Normal at Armour.
- Feb. 2—Detroit at Detroit.
- Feb. 3—Michigan State Normal at Ypsilanti.
- Feb. 7—N. I. S. T. College at Armour.
- Feb. 10—Augustana at Rock Island.
- Feb. 16—Y. M. C. A. College at Y. M. C. A.
- Feb. 17—Wheaton at Armour.
- Feb. 24—Augustana at Armour.
- Feb. 28—U. of Detroit at Armour.

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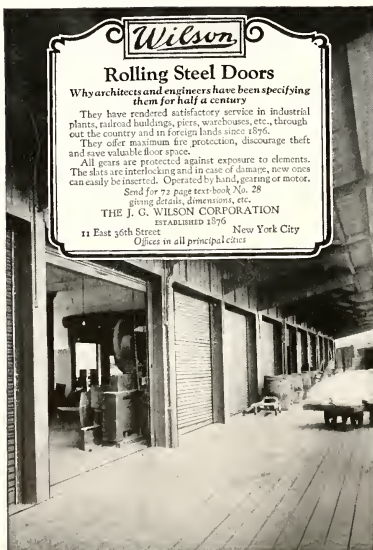
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The **ARMOUR ENGINEER**

VOL. XIX

MARCH, 1928

NO. 3



The Chicago Harbor of the Future

*Published Quarterly by the College of Engineering
Armour Institute of Technology
Chicago, Ill.*

Member of Engineering College Magazines Associated

Diplomatic Diction in Berlin



HOTEL ADLON, BERLIN, GERMANY

Two German diplomats, who had been at the University of Bonn together, met in the foyer of the Hotel Adlon after a separation of some years. One of them had been at a South American capital, one in the Orient.

Eagerly they discussed old times and common memories, and they were still talking excitedly as they started toward the Otis Elevator. When they reached the door, they paused, each wishing to give the other precedence.

"But you must go first, my good friend," one of them was heard to remark. "I'm sure the ride will be a novelty to you after so many years in the East, and I would not think of preceding you."

"On the contrary," answered the other, "I am insisting that you enter first. We lacked some things in the Orient, but the Otis, there as here, is in all the big shops and hotels." "We'd better squeeze in together, then, because South America, too, is well equipped! But wait a moment! You must go first, for I used the Otis on board the steamer every day!" "I, too! I will not be outdone!"

Starting forward together, they collided at the door.

One would have to travel farther than civilization, East or West, to find any novelty in that taken-for-granted convenience, the Otis Elevator.

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THE ARMOUR ENGINEER

Published Quarterly by the College of Engineering

ARMOUR INSTITUTE OF TECHNOLOGY

Volume XIX

March, 1928

No. 3

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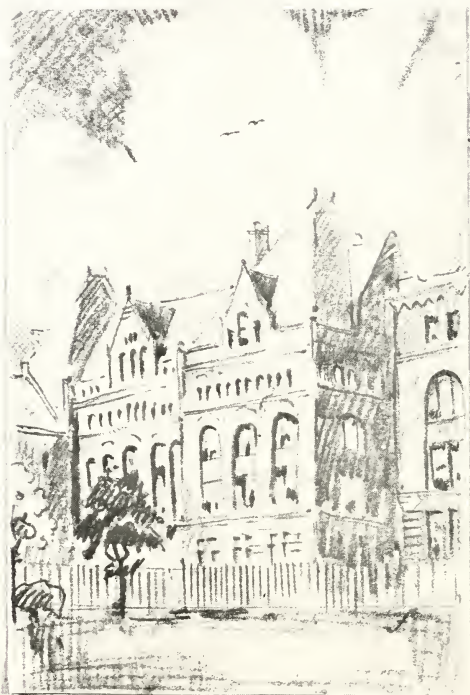
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Administration Building

The ARMOUR ENGINEER

Volume XIX

March, 1928

Number 3

16,000,000,000

BUSINESS LETTERS LAST YEAR

By T. H. Bailey Whipple

Literary Critic, Westinghouse Electric & Manufacturing Company

THE written word is now involved in at least 93 per cent of all business transactions. This means an average of not less than 150 letters per year per individual of the entire population of the United States. In 1925, the bank clearings of the entire United States, according to Secretary Hoover, exceeded \$500,000,000,000 of which the net income amounted to more than \$12,000,000,000. Despite these appalling figures, it is a fact almost incomprehensible that our colleges, and even business itself, are sadly neglectful of that great cultural and business force—the power of language?

"Although of so recent growth," says William Dwight Whitney, "the science of language is already one of the leading branches of modern inquiry. It is not less comprehensive in its material, definite in its aims, strict in its methods, and rich and fruitful in its results, than its sister sciences."

It is a strange and paradoxical fact in human nature that we are blind to the obvious. It is also true that, as Emerson says, "We are as lazy as we dare to be." Good letters require much thought. Many who are physically industrious, abhor the very idea of real thinking. Good taste, mental culture, intellectual joy will inspire but the fewest; America's god, *Money*, will actuate many of financial vision to utilize in the race of competition this money-making power of better busi-



ness expression. It is ambition's vulgarist motive, but, apparently, its only hope.

Ever since the advent of the steam engine and the electric motor, business has made tremendous strides in the field of production. The recent World War taught us the economy of mass production. Production costs have been marvelously lowered, and yet the struggle for comfortable existence under the new living standards is now even more grueling than ever before in the World's history. This condition will not be relieved until the problem of economic distribution has been more nearly solved. Economic distribution is simply low cost of selling, and it is just here that *Printed Salesmanship*—the letter, the advertisement, the editorial, the catalogue, the folder and other inserts will play their vital and powerful business-getting roles. Fol-

lowing the intense and the immense production period of ten years since the late war, the Economic Distribution Period is dawning. Are we in earnest and intelligent preparation for it? Do we realize that the one greatest tool to meet this new era and its inevitable competition, the one most powerful and effective general utility tool is the development of the potentially vital power of the business letter and its associate business literature?

We marvel at the stupendous size and rapid growth of the business of The Ford Motor Company, the General Motors Company, the United States Steel Corporation, and many other manufacturing concerns. Printers' ink has been responsible for most of this growth, even that of the United States Steel Corporation, for what institution, not excepting Ford, ever received more indirect and free advertising? One retail store in Chicago had sales of \$750,000 on one day in December 1927. Newspaper and direct-by-mail advertising were the chief factors in this result. However, these records will be astonishingly eclipsed in the future by the business of mail order houses which is nearly all created by the letter and well-edited catalogue.

What is business? Is it not essentially salesmanship? Is it not conviction, persuasion, the creating of confidence, good will? In brief, influence? The power to get the other fellow to willingly accept your viewpoint? Can

this high art be acquired when its medium, speech, is so neglected by business and the schools?

To exert this influence, one must think straight. "He who writes badly thinks badly. Confusedness in words can proceed from nothing but confusedness in the thoughts which give rise to them." Can one think beyond his vocabulary? No. And of what use is a vocabulary except to express logical though logically? "Words and thoughts are so inseparably connected that an artist in words is necessarily an artist in thoughts."

Why are poets, dramatists, the gifted writers in all literary fields—Why are orators and conversationalists, such as Edmund Burke and Dr. Samuel Johnson, the most beloved, respected, admired, influential, and envied among the immortals of all the ages? Why can the salesman of power of speech overcome, to a large degree, opposing advantages of price, performance, and delivery of his goods? Is it not largely, almost wholly, because of his logic and personality, both reflected in his clear thinking which finds its effectiveness in persuasive and forceful expression?

What should be the calibre and qualifications of the business correspondent and the writer of advertisements? He should have the solid background of brain potentiality, training, ideas, facts, experience and reflection. The effective letter writer and advertisement writer should have no uncertain or inadequate knowledge of the subject about which he writes. If the subject be selling, credit, collections, adjustments, or any subject coming under the various general and special classifications into which business writings are divided upon the basis of their various and special functions, the writer should know the fundamental principles of each—indeed, he should have a ready and familiar knowledge of each subject, per se, and much correlative knowledge in the fields of economics, and the constitution of the human mind. In addition to special knowledge, the efficient letter writer possesses much versatility and resourcefulness, embracing much in the broad field of general culture. Obviously, writings should be logical in thought and arrangement. This involves thought, analysis, and deduction if what is written carries the weight of conviction. To be persuasive involves a knowledge of psychology, with the application of tact and discernment suited to the particular reader or readers. A large vocabulary and fluency of speech can never compensate for the lack of understanding and insight, resourcefulness, special and encyclopedic knowledge.

Like the electrical business, modern advertising is comparatively new. A certain "halo" has encircled each, attracting a multitude of adventurers and "misfits"; Men attempting to write sales letters and advertisements, bereft of aptitude, imagination, education, experience, tact and originality



The difference between a precious stone and a common stone is not an essential difference—not a difference of substance, but of arrangement of the particles—the crystallization. In substance, the charcoal and the diamond are one, but in form and effect, how widely they differ!

Two men have the same thoughts; they use about the same words in expressing them; yet with one the product is real literature, with the other it is platitude.

The difference is all in presentation; a finer and more compendious process has gone on in the one case than in the other. The elements are better knitted and fused together; they are in some way heightened and intensified. Is not here a clue to what we mean by style?

Polish, choice words, faultless rhetoric, are only the accidents of style.

Indeed, perfect workmanship is one thing; style, as the great writers have it, is quite another. It may, and often does, go with faulty workmanship. It is the choice of words in a fresh and vital way, so as to give us a vivid sense of a new spiritual force and personality. In the best work, the style is found and hidden in the matter.

—JOHN BURROUGHS.

and the urge to study and learn—"fools rushing in where angels fear to tread." My personal opinion is that such men are not so lacking in judgment as are those false economists who afford them the opportunity to destroy business already established and to lose the opportunity of securing potential and competitors' business.

The most important part of any ad-

vertisement is its copy. Because this is true, the relation between letter writing and advertising copy is, obviously, very close. Both involve vitality of expression—they embody the same language principles—the differences are more imaginary than real, and, at most, are in minor phases, rather than in essentials. The advertisement is, in a sense, less personal, more condensed, can appropriately be more assertive and audacious, but each should embody the broad principles of vision, sincerity and beauty.

What constitutes effective business writing, or good writing of any kind, for that matter—What are its principles? They are, according to George Henry Lewes, the trinity of intellectual, moral, and aesthetic principles:

Vision—dealing with facts, data, information, etc.

Sincerity—dealing with truth.

Aesthetic—dealing with beauty through appropriate expression.

The most effective business writing is that which is richest in the qualities of clearness, conciseness and correctness, which is in every word and phrase and paragraph respectfully considerate of the reader.

A good method to follow in writing, and the criticism of one's own composition is the following:

- a Spontaneously dictate the matter under consideration. Emerson says that our spontaneous thoughts are often our best ones.
- b Review for logical sequence.
- c Review for conciseness.
- d Review for unmistakable clearness.
- e Review for proper choice of words.

Regard every business letter, no matter what its particular phase, as a sales letter. So far as possible, make every letter adaptable to the reader. Put courtesy and the proper tone into every letter.

In conclusion, consider that great book, *Brain and Personality* by Wm. Hanna Thomson, M.D., L.L.D., America's greatest neurologist. In his chapters on Speech, he says in part:

"There is one physiological standard by which man can be truly measured, which applies to him alone, and which rounds his whole marvelous being—his faculty of speech. The immeasurable distance between man and every other animal on earth is fully accounted for by the existence, the nature and the significance of man's words."

A wise old Greek daily made this prayer.

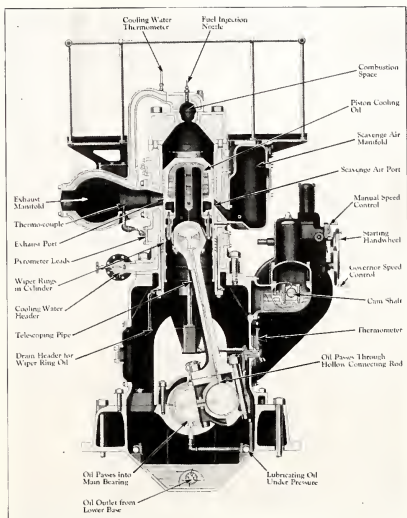
"O great Apollo, send down the reviving rain upon our fields; preserve our flocks; ward off our enemies; and build up our speech."

DIESEL ENGINES

By W. T. Watt, '17

Fairbanks, Morse & Company

Illustrations furnished through courtesy of Fairbanks, Morse & Company.



This transverse section through an 850 hp. airless injection, two cycle Diesel engine illustrates the simplicity of this type of prime mover.

DURING the past ten years the Diesel engine has become such an important factor in solving the problem of low-cost power production that it has been widely adopted. It has been estimated that at the beginning of 1928 there were approximately 4,000,000 hp. of oil engines in stationary power plant service. Every year has seen an increasing use of Diesel engines and a widening of the field of application. This prime mover is no longer an engineering novelty but has been established by years of dependable service.

If it were possible to sum up the reasons for this rapid growth in the application of Diesel engines, the following factors might be listed:

High economy. A Diesel engine converts into mechanical energy at its shaft about 35 per cent of the heat energy of the fuel it consumes. This thermal efficiency far surpasses that of any other prime-mover in practical use. The Diesel's fuel consumption is between .4 and .5 pound of oil per brake horsepower-hour.

Economy at light loads. An oil engine maintains its high economy throughout the entire useful load range, the fuel consumption per horsepower at half load exceeding

that at full load by only 10 per cent.

Cheap fuel. As compared with the gasoline engine, the Diesel uses a fuel costing only one-quarter as much.

Economy in small sizes. In great contrast with a steam plant, the small oil engine has practically as good an economy as the large one. This makes it possible to build an efficient power plant just large enough to meet present needs and to enlarge it with additional units as the load grows; at all stages of growth the efficiency is high.

Sustained economy with use. Again in strong contrast with a steam plant, Diesel efficiency falls off very little with use. Steam plant efficiency de-

pends upon maintaining clean boilers and upon incessant control of the furnace conditions. In the Diesel all of this is absent, and a clear exhaust is positive indication of high fuel efficiency.

Independence of water supply. An efficient steam plant requires great quantities of condensing water; the Diesel consumes very little water and can be successfully used in the most arid districts.

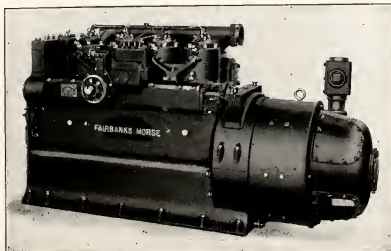
Compactness. The oil engine is a complete power plant in itself, takes up a small amount of space, and can be readily placed.

Quick starting. A cold oil engine plant can be started instantly and made to carry full load in a few minutes.

Economy in labor. No fire room force is required.

Freedom from nuisance. There are no ashes to be disposed of; no noisy and dusty coal handling equipment, no smoke; all noise can be easily eliminated.

In order to understand why the Diesel engine is so rapidly taking its place in industry, it is necessary to know something about how this type of prime mover operates. The accompanying sectional view shows an 840-horsepower engine which illustrates the gen-



A 40 kilowatt Diesel engine direct current generating set operating at 800 r. p. m.

eral trend in Diesel engine development.

The operation of a Diesel engine is quite different from the automobile engine. A low grade fuel oil is injected into the combustion space about the time the piston has nearly reached upper dead center. Due to the compression pressure of about 500 pounds per square inch, the temperature of the trapped air rises to about 1000 degrees Fahrenheit and ignition of the fuel charge begins. As combustion proceeds the burning gases expand through the orifice and combustion is completed in the cylinder proper. No explosion takes place and there is no rise in pressure, for the gases burn evenly and the expansion is quite similar to steam.

As the piston is driven downward on the power stroke it first uncovers the edge of the exhaust port and the pressure in the cylinder drops to practically that of the atmosphere. The inlet air port is then uncovered and the air, which is forced into a manifold on the side of the engine by a compressor which is built in as a part of the engine, rushes out through the cylinder, blows out the burned gases and fills the space with fresh air. In smaller sizes of engines this scavenging air is compressed in the crank case by the downward movement of the piston and flows from the crank case up through a passage to the cylinder and into the cylinder when the inlet port is opened. The piston again moves up and as it reaches its highest point fuel oil is

again injected through the nozzle.

This type of Diesel engine is known as the two-cycle, airless injection type. It differs from the four-cycle engine in that there is a power stroke in each cylinder at every revolution of the crankshaft. In some types of Diesel

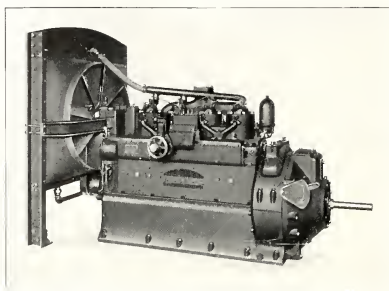
a pump and passed through a strainer and cooler, which are a part of the auxiliary equipment of such a plant. The stream of oil flowing through the piston keeps the piston head cool. In smaller sizes of engines the piston cooling feature can be safely eliminated.

One hand wheel, as shown in the accompanying photographs, is used for starting and stopping the engine. When the wheel is thrown over to the start position the starting air comes on, and then as the wheel is brought back to the run position, the flow of oil to the injection pumps begins.

Another hand wheel, which is located on the governor, may be used to change the speed through a considerable range. This is used when it is desired to parallel two or more Diesel-electric units or where the drive requires a speed variation.

The year 1927 has shown a remarkable expansion in the field for Diesel power. This increase in the range of application work is typified by the building of two 12,000 hp., 2 cycle, airless injection Diesels for a generating station in Berlin and by the installation of an 18 kw. Diesel generating set for battery charging, in Chicago. The field between these two extremes of the year's work in Diesel engine application is filled with a diversity of uses, many of which mark very definite trends in the use of this type of prime mover.

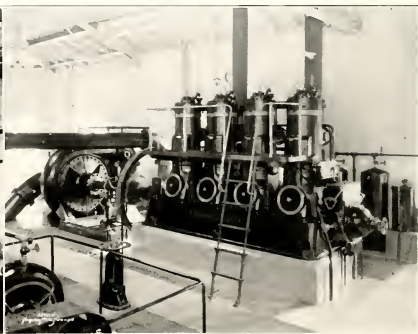
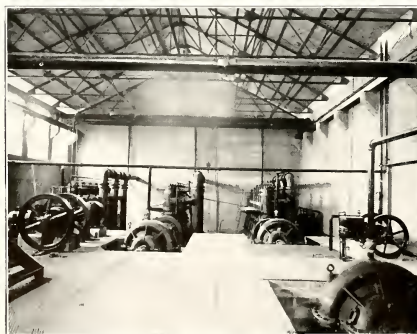
In the general field of power applications represented by the public utility and municipal plants, there has



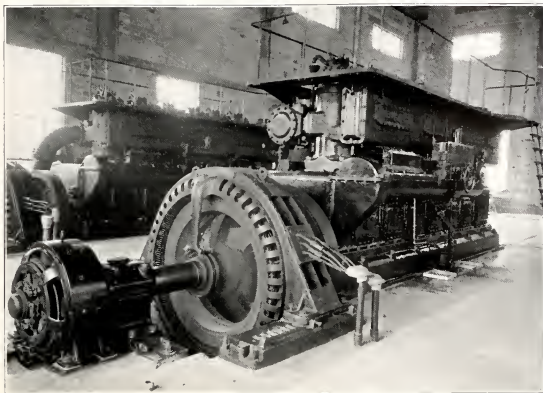
This 60 hp. Diesel engine, with radiator cooling represents the latest type of Diesel equipment for excavating machinery, industrial locomotives, and similar equipment.

engines, the fuel is injected directly into the cylinder with the aid of compressed air at about 1000 pounds pressure.

The progress in the design of Diesel engines has been such that these engines are very simple to operate. The lubricating system, for instance, in the engine illustrated, is completely automatic and there is not a single point on the engine which is not reached by pressure lubrication. The lubrication oil is pumped into the main bearings, flows up through the hollow connecting rods and up into the top of the pistons and then back down into the crank case, where it is picked up by



At the left is the plant of the Hidalgo Water Improvement District No. 4 at Edinburg, Texas, equipped with six 360 hp. Diesels direct-connected to 30 in. centrifugal pumps. At the right is the plant of the Atlantic City Sewage Co., where a 240 hp. Diesel direct-connected to a sewage pump has effected marked savings in the cost of pumping sewage.



Two 720 hp. Diesel engines in a municipal plant at Harlingen, Texas, where 2400 hp. in Diesels are in use.

been a very marked expansion in the number of plants. The year 1927 will go down in history as the best year to date in this particular field of power application.

The Diesel engine has also made remarkable progress during the past year in the general industrial power field. There have been many applications in woodworking plants, machine shops, small manufacturing establishments, cotton seed oil mills, brick plants, quarries, construction projects, coal mines, hotels, textile mills, packing plants, and dairies where the Diesel engine has never before been considered as a logical prime mover. Improved efficiency, reliability, better quality, and lower cost of Diesel engines have undoubtedly had much to do with making it possible for industrial organizations to take advantage of the economy of Diesel power.

Another field for Diesel power which has made considerable progress during the year is in connection with pumping installations. The direct connection of Diesel engines to either centrifugal or screw pumps makes a very compact, highly efficient unit with which it has been found possible to pump water at remarkably low costs. One installation recently completed in the southwest has six 360 hp. Diesel engines direct connected to 30 in. centrifugal pumps with a combined capacity of 180,000 g.p.m. Another application of Diesel engines to a pumping plant is the direct connection of these units to closed impeller sewage pumps. An installation of this type has recently been completed by

the Atlantic City Sewage Company at Atlantic City, New Jersey.

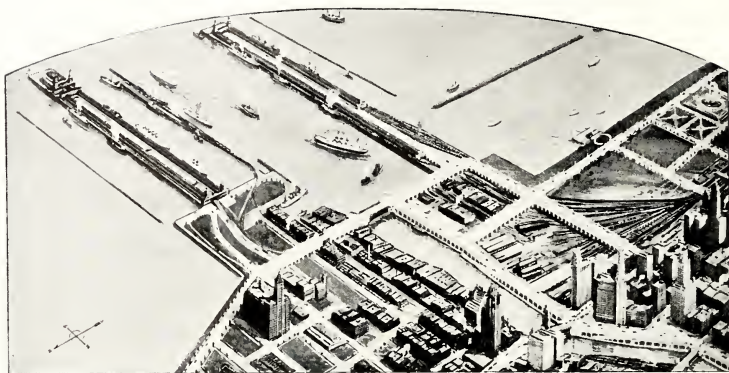
There has also been a wider use of Diesel engine compressor units particularly in connection with construction operations, mining, and for air lift pumping work. In remote sections where fuel costs are high these units have made some amazing cost reductions. Even in the metropolitan areas, however, types of units are being used in increasing numbers. Arthur McMullen, a contractor for one section

of the New York subway, is using two 240 hp. engines driving angle compound compressors in connection with the subway construction work. Another installation is at the new Proviso Yard of the Northwestern Railway Company in Chicago. The new Proviso Yard is the largest classification yard in the world. Here the compressed air requirements are being supplied by a 180 hp. Diesel direct connected to a compressor.

In the field of excavating machinery there has been very marked progress during the year. The range of use has been extended to both larger and smaller size of drag lines, shovels, and various other types of both marine and land excavating equipment. The automotive type of gasoline engines has developed an extensive field of application in such machinery. In order to make the Diesel engine competitive with it, it was necessary to decrease the weight in proportion to the horsepower and to make the engines much more compact. Several developments along this line were announced during the year, the general trend of these being in higher speeds up to 900 r.p.m. and in the use of block cylinders very similar to automotive type of construction. As a result of this development it is now possible to equip a one yard shovel or drag line on a basis which is competitive with gasoline power and with a considerable saving in operating cost to the purchaser.



Two 240 hp. Diesels direct connected to angle compound compressors are being used by Arthur McMullen, a contractor handling a part of the New York subway work.



The proposed commercial harbor at the mouth of the Chicago River.

The HARBOR PLAN of CHICAGO

By H. E. Larson, '28

Student in the Department of Electrical Engineering

CHICAGO surveys her handicraft. Her blockhouse and pioneers of but a century ago have become a throbbing metropolis, a center of commerce and industry, with a population of over three millions. Her growth has been phenomenal, ridiculing the most optimistic estimates. Her future, equally hard to estimate, is full of promise, for there are factors at work, which if directed most advantageously, will make Chicago the greatest city in the world.

The influx of lake and ocean traffic that will follow the opening of the St. Lawrence Waterway is one of these factors. The St. Lawrence Waterway will provide a least depth of 25 feet which will permit the cargo liner and the tramp steamer to reach Chicago with ease. Large ocean liners carrying passengers and high class freight draw about 30 feet of water and cannot therefore be expected to navigate the St. Lawrence Waterway. However, by far the greater part of the world's ocean traffic is carried by the cargo liner and the tramp, so that the majority of ocean traffic destined hin-

The Commercial Club of Chicago, with Major Rufus W. Putnam as engineer in charge, has made a study of harbor facilities in the Chicago region, and has developed a harbor plan.

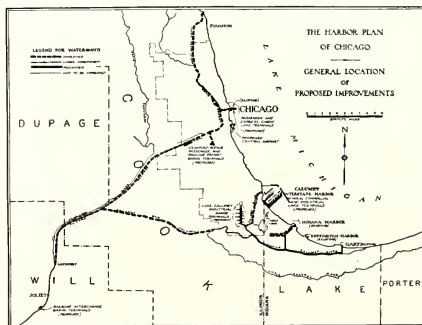
For the information contained in this article, and for the illustrations which accompany it, we are indebted to Major Putnam and his associates.

terland may reasonably be expected to dock at Chicago harbor.

Then too, commerce will be further stimulated by the completion of the Lakes-to-the-Gulf Waterway which will provide a least depth of 9 feet between Chicago and the Gulf of Mexico. Barges will be the carriers and will provide economical and efficient transportation to the various harbors already existing along the banks of the Mississippi River to the Gulf.

Chicago, then, will be an ocean port;

and more, it will be the distributing center of the nation, both commercially and geographically. Its railroads radiate to all corners of the continent; its highway system, when completed, will facilitate extensive overland traffic; and even now, there are six air lines terminating at its airports. Its municipal harbor, however, as it now exists, will provide no facilities for the traffic that is sure to come. Chicago will need a harbor with the most efficient terminal facilities possible. The development of such a harbor is imperative to the growth of Chicago; to enable her to take full advantage of



A map showing the general location of the commercial harbor, the Calumet interstate harbor, the Lake Calumet barge harbor, and the Crawford Avenue barge terminal.

the lake and ocean commerce brought to her front door by favorable circumstances and position, with little direct effort on her part.

The considerations that have the greatest bearing on the design and location of a water terminal are the following:

- a. Physical features of the terminal region including transportation facilities.
- b. Characteristics of water carriers and water routes.
- c. Load characteristics.

Port facilities should be so designed and located that expansion may be carried out on a unit basis indefinitely. A fixed bridge policy, between the commercial harbor and the

open sea, is practically essential to the success of a harbor, which means high bridges that will allow ocean vessels passage without opening, or no bridges at all. When it is remembered that Montreal has its harbor 1,000 miles inland, it is realized that the location of a port some distance from the sea is no great handicap if the difficulties of navigation in the way of restricted channels are not too great. Free, unrestricted, and direct interchange of freight between all kinds of land and water carriers should be provided at all major terminal developments within a port.

The Chicago harbor, as a commercial center of distribution, will extend an influence over the central and greater part of the United States. Its influence will be most directly felt, however, in the Chicago region. The Chicago region covers an area of approximately 6,800 square miles with a population of approximately 4,600,000. Over 75 per cent of this number of people live within a fifteen mile radius of the heart of the city. The region contains about 500 square miles of urban area of which approximately 25 per cent has been zoned for industrial purposes. Considering the small percentage of the area of the region occupied by cities and villages, and the still smaller amount zoned for industrial purposes, it is evident that there is room for expansion of both.

The transportation facilities of the Chicago region are represented mainly by twenty-one independently owned trunk line railroads radiating from

Chicago in all directions and entering the region on their own tracks. There are three principal belt lines interchanging cars with these railroads which divide the region into three zones. The present highway system in and around Chicago is not all that it might be although plans are under way for an 80 foot highway system

of 30 feet.

The sailing distance from Montreal to the westerly end of Lake Superior is about 1,340 miles, and to the southerly end of Lake Michigan, about 1,200 miles, of which about 1,000 miles is through open lakes in each case. The St. Lawrence River is 1,185 miles long, 182 miles of which are above

Montreal. The rapids between Lake Ontario and Montreal are overcome by a series of side canals and locks some of which are comparatively short and have least depths as low as 14 feet. A plan has been proposed, however, that will reduce the number of miles of restricted channel to 25, with not more than nine locks and eight bridges, and with a least channel depth of 25 feet.

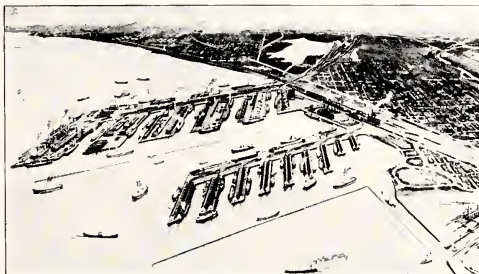
Lock lengths and depths are determined, of course, by the size of the carriers that may be expected to pass through. The largest

lake freight vessel is about 625 feet long and 64 feet in beam with a carrying capacity of about 14,000 tons. The largest ocean vessels now reaching Montreal, where the limiting draft is 28 feet, are about 14,000 gross tons register, from 550 to 600 feet in length and from 65 to 70 feet in beam.

The open water route of an ocean vessel to Chicago harbor is interrupted by several locks. Between Chicago and Lake Superior points the Falls of St. Mary's River have been overcome by the Soo Locks which are of proper depth. The Inter-lake channels above Buffalo have been improved to depths in excess of 20 feet and Niagara Falls is overcome by the Welland canal, 26¾ miles long, with 25 locks of 255 feet available length, and 14 feet depth on the sills. A new and somewhat shorter canal is now being built, however, with seven 800 foot by 80 foot locks having a least depth at lock sills

which can be extended to take care of any increase in traffic imposed by harbor development.

The size of barge carriers is important because bridges should be built that will permit their passage without opening. The largest self-propelled barges now in use are 280 feet long and 50 feet wide requiring 37½ feet of headroom. Self-propelled barges operating between Chicago and New Orleans or Pittsburgh could be as long as 325 feet and as wide as 65 or 70 feet. With the use of Diesel engines



Ships carrying general cargo which cannot find accommodation at the commercial harbor will be served at the proposed interstate harbor, pictured above.



The anticipated congestion of the Calumet river led to this design for a barge terminal in Lake Calumet.

these barges may be built to clear bridges providing 16½ feet of headroom.

The total waterborne traffic in the Chicago region at the present time varies between 20,000,000 and 25,000,000 tons annually with a value of between \$450,000,000 and \$500,000,000; in addition there is a passenger traffic, largely out of Chicago harbor, involving the annual movement of about 1,400,000 persons.

The question of freight rates is difficult to settle. It is certain that it will be cheaper to ship goods destined for European ports by way of the St. Lawrence Waterway than to ship by rail to the east coast thence by way of ocean carriers.

Knowing the characteristics of the Chicago region, the volume of traffic that may reasonably be expected, and the type of craft that will bring it to Chicago harbor, an intelligent design and location of a harbor may be arrived at. The ideal location is not to be sought after as much as the expedient one.

That the harbor should be located on the lake front is generally conceded. There are three locations that might be considered potential harbors, all having good and bad features. The frontage between Oak Street and Randolph Street is the first location that suggests itself because of the already existing Municipal pier and Chicago River harbor. The frontage between 16th Street and 41st Street, known as Harbor District Number 3, also demands attention. When the manufacturing area of the Calumet district is remembered, it becomes apparent that a harbor should be provided for these industries that are now using the Calumet River, which has become congested. The frontage between 80th Street and a mile east of the old entrance to Wolf Lake must therefore be considered. Tabulation of the disadvantages of each location will surely aid in understanding the reasons for the final selection:

Municipal Pier Area

- Limited extent of lake front.
- Congested condition of nearby streets.
- Restricted space for railroad yards.
- High cost of adequate rail connections.
- Obstruction to barges along channel to barge terminal necessitating lightering.

Harbor District Number Three

Interference with park program.
High cost of adequate rail connections.

Obstructions to barges along channels to barge terminal plus added cost of auxiliary protection on lake front for safe passage of barges to mouth of river.

Near Mouth of Calumet River

Remoteness of location with respect to those shippers and consignees served by truck.

Necessity of lightering some

age freight and a limited amount of general cargo.

Ships carrying general cargo that ultimately may not find accommodation near the mouth of the Chicago River will be served at an interstate harbor on the Lake Front south of Calumet Park where rail and highway facilities will be of the highest order.

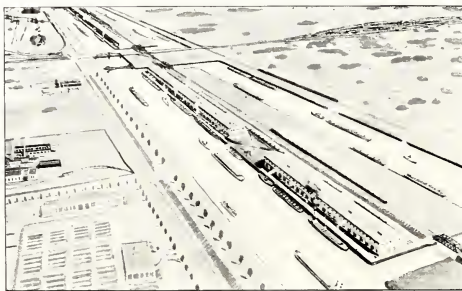
The ultimate industrial harbor will be located on the lake front opposite the old entrance to Wolf Lake, and is not to be confused with the interstate harbor. Here industrial and bulk interchange facilities for the handling of such materials as coal and ore will be provided. Of course, the present locations on the Calumet River and the Indiana Harbor Canal should be utilized as long as channel capacity permits.

Barges to and from points on the Lakes-to-Gulf Waterway and connecting channels carrying general package freight will be accommodated at a commercial terminal on the Chicago Drainage Canal near Crawford Avenue, where adequate rail connections exist.

Barges from the harbor at the mouth of the River will reach this terminal by way of the River; those from the interstate and industrial harbors will travel via the Calumet River, the Little Calumet River, and the Calumet Sag Channel. This channel which connects the main drainage canal with the Little Calumet River has a minimum bottom width of about 36 feet. While this width is ample to start with, traffic exceeding about 2,000,000 tons per year will find the channel too small and its widening will be a necessity.

When the traffic in the Calumet region is large enough to justify the expense a commercial barge terminal will be provided in Lake Calumet. This barge terminal will answer all requirements in the way of water front sites for industries desiring to utilize either lighters or barge service over the Lakes-to-Gulf Waterway. However, the ultimate use of Lake Calumet as a barge terminal will be regulated largely by the congestion in the Calumet River which is one of the reasons why the Crawford Avenue Barge terminal is given preference in sequence of construction recommendations.

If and when rail-barge interchange traffic in package freight to and from points to the north and east is of sufficient



This proposed barge terminal at Crawford Avenue and the Drainage Canal will furnish a point of connection with rail and motor transportation.

barge-to-ship transfers from barge terminal to ship harbor, or

Ultimate widening of the Calumet Sag Channel and raising of bridges to provide headroom of at least 21 feet.

When the disadvantages of each of these schemes is considered a conclusion is reached that the centralization of commercial lake terminals is impracticable. Those true of the first two plans cannot be overcome except at what might be prohibitive costs, and some could not be overcome at all, as far as a centralized terminal is concerned. However, a solution combining a moderate addition to the facilities at the mouth of the Chicago River with provision for an extensive ultimate development on the lake front a mile north of the old entrance to Wolf Lake effects a compromise which seems to offer the greatest advantages and least disadvantages.

The ultimate commercial harbor at the mouth of the Chicago River will involve a companion pier to the present one and extension of necessary rail and tunnel facilities. Lake passenger and package freight vessels, and such ocean liners as may utilize the St. Lawrence Waterway will dock at the piers. The facilities will be restricted to the handling of only high class pack-

(Continued on page 108)

MINNOWS

in the Circulating Water of a Condenser

THE influence of the presence of minnows in the circulating water on condenser heat transfer at the Crawford Avenue Station is of such importance that it gives rise to a question which will be discussed at the close of this paper. There are many factors entering into a determination of this kind. Some of them can be determined accurately, some of them can be guessed at with a fair degree of accuracy, and others must be assumed. Since conditions are constantly changing at a power station such as we are to discuss, many and most of the quantities dealt in must necessarily be averages.

The ultimate purpose of this paper is to show how much more water is used for condensers than would be used were there not minnows in the circulating water.

At the Crawford Avenue Station the unit number one is a 50,000 k.v.a. Parsons. The average steam consumption is about 8 pounds per kw. hour.

The amount of circulating water used by the condensers may be assumed as 60 pounds per pound of steam condensed. This is the present consumption of circulating water. The function of this water is to take heat from the exhaust steam. Evidently the specific heat of the water should be as high as possible so that the least possible amount of it must be used. The presence of minnows in the circulating water causes a decrease in the specific heat. The number of minnows in a unit amount of the fluid will be one of the important factors which we must study.

Perhaps a little consideration of the method of obtaining the condenser water at the Crawford



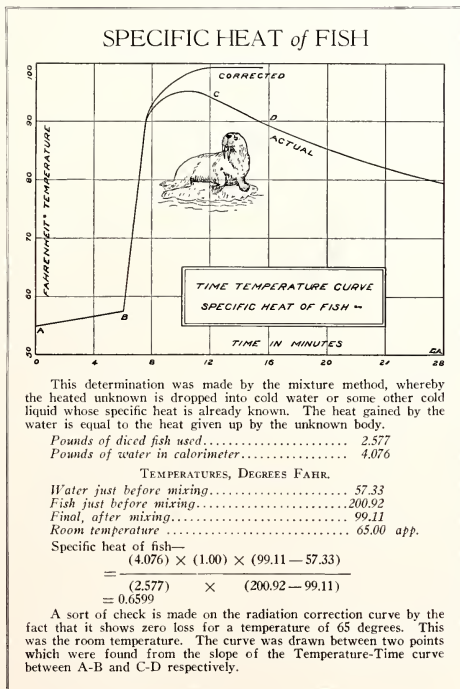
A Fish Story

Station would be worth while. This water is taken from the Drainage Canal. A ditch leads from the canal to the pumping house of the station. In the pumping house are huge pumps and large screens. The purpose of the screens is to sift out any refuse that may have been floating down the Drainage Canal. Many of the minnows are caught on the screens and hence do not enter into the condensers. If the season is springtime, there will be more minnows in the canal than if

it were fall. However, in the fall and winter months the water is colder and the tiny fish are more aggressive. They swim constantly forward during these aggressive months and so when they come to the screen they are more apt to go right through it. For larger fish this might not be true. But for minnows whose dorsal and ventral fins are not yet fully developed, the fins do not protrude enough to keep the fish from passing the screen. Likewise in the spring and summer months the minnows are likely to let the current carry them along, and so strike the screen in such a manner as to be prevented from passing through. The

average number of fish to be found in the condenser water in the winter would probably be the same as in the summer. If an unbalanced assumption is made in this case, the probability is that most fish get through the screen in the winter time. This would be so because the numerical increase of spring and summer would be far outweighed by the increased aggressiveness of the fish during the colder weather. From an eminent authority on power plants who is well qualified to make scientific guesses we have obtained the information that the average number of minnows to escape through the screens at the Crawford pumping house is about twenty per gallon of water. This estimate seems low when it is considered that these minnows have only recently been inspired by such sights as the Municipal Pier, the Wrigley tower, and the Michigan Boulevard Bridge, and that they would not be willing to be stopped by a screen.

The weight of these
(Cont. on page 106)



The UNDERWRITERS' LABORATORIES

By O. R. Besch, '28

Student in the Department of Fire Protection Engineering

MAN was no different from other animals until he began to try to change circumstances to suit his will rather than to adapt himself to circumstances. *Man was not man until he began to meddle.* The chief reason for this desire to alter conditions was that of self-preservation.

The first developments were crude and bungling attempts to make life easier, but they worked, after a fashion, and man's constant efforts to meddle with nature, or *experiment*, as we say nowadays, have finally, after thousands of years, given us our modern civilization.

At the time of man's first attempts to alter circumstances, his chief worries were to provide himself with shelter, clothing to resist cold, and weapons for defense and hunting. In each case, at the start, these things must have been more or less accidental discoveries, but they worked.

Then man discovered fire.

With the discovery of fire, man had in his hands the power which would enable him to subjugate nature. Fire plus iron ore gave him steel, the indispensable building material. Fire in the boiler of a locomotive gave him fast transportation; essential for the continued prosperity of any nation.

But nature is not easily conquered. We may suppress her in one way only to find that she has asserted herself in some other manner. We find that we have eliminated the comparatively few and simple hazards of primitive life only to be confronted with an almost bewildering number of artificial dangers. That is, they are bewildering to a disinterested bystander, but we moderns are so much interested in our fascinating game of life that we ignore the dangers connected with it. The hazards become simply a part of the game.

In all branches of human endeavor the story has been the same. In agriculture, commerce, and industry,

science has made wonderful progress. There is every evidence that the skill that has made possible our modern life is not dormant, and that the changes of the next few decades will surpass those of any previous generation.

perhaps, that a mixture of gasoline vapor and air was explosive. Some other person found that this property of gasoline vapor could be utilized to drive machinery. Soon gasoline came into daily use by millions of people.

Along with service, it brought a universal hazard; it has exacted a huge toll of life and property.

The search for these new powers is still dominant, but a new note of caution has been sounded in the last few years.

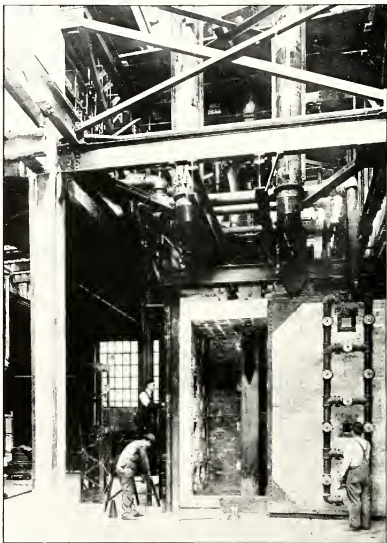
We have learned that we must consider the laws of economics before rushing blindly into things; that is, we have learned that the use of new devices and methods is likely to cost dearly and we are looking ahead for methods of conservation. The cases of electricity and gasoline have already been mentioned. These prominent aids to modern progress have been and are being subjected to this investigation which now accompanies the use of our new-found powers.

The attitude of the public toward fires is gradually changing, along with the attitude toward other calamities that befall humanity. At one time a fire which destroyed a man's property was considered to be an act of Providence. People did not realize then what we all now know to be true: that fire is a phenomenon of nature and is subject

to nature's laws. In other words, there is nothing supernatural or unearthly about fire—it is subject to laws of nature at every phase of its existence. It is perfectly possible to learn all the ways in which a fire may be caused and thus learn how *not* to cause it. Thus fire prevention is strictly a matter of applied science.

It is for this reason that Underwriters' Laboratories came into existence.

Underwriters' Laboratories was, in a way, an outgrowth of the Chicago World's Fair in 1893. At this time, William H. Merrill came to Chicago



A combination furnace and ram. Through the peep-holes in the side of the furnace, the effect of fire on the loaded column is observed. Tests of 100 different columns, over a period of four years, were made here.

It is needless to enumerate the uses to which electricity has been put since Faraday discovered the principle of the dynamo. Electricity has become indispensable, as we realize when occasionally our electrical service is interrupted.

The widening use of electricity has brought about a widening hazard. Protective methods must be made the subject of intensive study in order to cut down the hazard due to the use of electricity.

Gasoline was originally a by-product of the illumination industry until someone discovered, to his sorrow,

to solve some problems in connection with automatic fire alarm service and to inspect the electrical installations at the World's Fair. Having need of a laboratory for some tests, he fitted out a room in one of the fire patrol stations. Mr. Merrill was doing this work for the Western Union, not the famous telegraph company, but an organization of fire insurance companies.

Electrical installations were becoming so common at this time that this work was continued even after the World's Fair. Two years after the Fair, in 1895, the National Board of Fire Underwriters became a contributor to the work started by the Union.

The work of the laboratories was gradually increased and in 1901, electricity had become so great a factor in business and industry that the work of the laboratories was quite important. Accordingly, in November, 1901, Underwriters' Laboratories was incorporated in the state of Illinois "to establish and maintain laboratories for the testing of appliances and to enter into contracts with the owners and the manufacturers of such appliances respecting the recommendation thereof to insurance organizations."

At the time of this incorporation, the laboratories were located in a two story brick building at 67 East Twenty-first Street in Chicago. By 1903, it had become necessary to find larger quarters. Accordingly, a site was secured at 207 East Ohio Street. On this site was erected a building that was as nearly fireproof as it is possible to construct any building. No wood is used in any part of the building, and all steel is protected by a fire-resistive finish. All the machinery used is safeguarded to as great an extent as is possible. In this building, the insurance underwriters, through Underwriters' Laboratories, have gone to the extreme in adopting in their own property all the measures they have recommended in the property of others. The original building has been enlarged several times, until now it has a frontage of 266 feet on East Ohio Street and contains about 100,000 square feet of floor area.

When we learn that the output of Underwriters' Laboratories labels increased from fifty million per year in 1915 to fifty million per month in 1922, we realize that the label plays an

important part in the affairs of the institution and is of great significance to the public.

The label is a certificate of merit awarded to an inanimate object. It "tells the world" that that object has been thoroughly tested and it conforms to the requirements of Underwriters' Laboratories.

The label is only one of the several forms of recognition of devices made or services rendered by a client of the Laboratories, but it is the most im-

portant shows sub-standard features, the maker corrects the defect on the subsequent products.

The other form of supervision is the Inspection Service, which is regarded as superior to the Re-examination Service and is recommended to be used where the use of the label service is not considered practicable. Inspection Service includes regular and frequent examinations and tests of the product at factories by Laboratories' engineers and also supplementary examinations at the Laboratories of samples obtained from the manufacturer or in the open market.

The work done at Underwriters' Laboratories is divided according to the nature of the device submitted.

In the protection Department are run all tests which have a bearing upon the safety and structural integrity of buildings, and other tests which are related in some way, as for instance, tests of safes, roof coverings, and fire doors and windows.

The job of determining the proper use of steel in construction work is an extremely important one, owing to the fact that when unprotected steel is exposed to fire, it loses most of its strength and is likely to fail. The problem was finally undertaken by Underwriters' Laboratories in cooperation with the United States Bureau of Standards and the Associated Factory Mutual Fire Insurance Companies.

During the years from 1912 to 1917 a huge combination of ram and furnace was installed at the laboratories. This furnace was capable of taking a twelve-foot column, loading the column with as high as 250 tons, to represent such part of a building as the column might be expected to support, meanwhile surrounding the column with an artificial fire as intense as an actual conflagration. In connection with this test furnace were instruments to measure and record the loads placed on the column, the temperature of the fire around it, the amount of sagging, bending and shortening under the influence of heat and pressure and, finally, the disintegrating effect of a fire stream turned on the hot column.

During this period, tests were made of every sort of building material and protective covering that could be found. In all, one hundred columns were tested, some of which still remain at the Laboratories, mute evi-



This wall section has just been rolled from the furnace, and is being cooled by a hose stream. The temperature of the window, when drawn from the furnace, was 1700° F.

portant form. In several industries, as for example the electrical industry, it is the first thing looked for by prospective customers.

Besides the initial tests which determine whether the product is worthy of the label, other tests are made at regular intervals either at the factory or in the Laboratories in order to determine whether the product is being held up to the standard. Some of the samples used in these re-tests are obtained through the manufacturer and some are purchased in the open market. In some industries, as in the manufacture of fire hose, an inspector is stationed at the factory permanently and supervises the inspection of each individual article.

Another form of supervision is called the Re-examination Service. In this form of service, samples are obtained from the manufacturer or in the open market and tests are made several times yearly. If an examina-

dence of an immense piece of work. The report of these tests fills a printed volume of nearly four hundred pages. This report is the basis for the specifications incorporated in modern municipal building codes.

Another phase of the Protection Department's work is in safe-testing. Safes were formerly regarded merely as a means to protect one's valuables from burglars. Nowadays, however, the business man places his convertible securities in a bank vault, and places only his business records in his own safe. His principal object is now to keep the records intact, even in case of fire.

The testing of safes in regard to their resistance to fire is one of the most searching and it is certainly one of the most spectacular of all the tests which take place at the Laboratories.

The safe as received from the manufacturer is inspected thoroughly in regard to its mechanical strength and resistance to rough usage. Following these tests, one of the samples is put thru the "explosion" test. Explosions have been known to occur in safes, due to the decomposition of water by the hot iron shell, and sudden access of heat to the hydrogen which is thus liberated. Excelsior, wood and kerosene are used to give a quick, hot fire for this test. After the fire burns itself out, a hose stream is played over the safe, and finally an examination is made. A sufficient degree of bulging is rated as an "explosion."

After the explosion test comes the "endurance test." The safe is placed in a furnace and subjected to a "standard" fire. The safe is considered to have failed when the temperature inside the safe reaches 300° F. Classification is made on the basis of the length of time a safe will protect its contents from fire. A rating of four hours is the highest given by the Laboratories.

The next test is known as the "drop test." A safe is heated for one hour, then is removed from the furnace, hoisted thirty feet and dropped on a pile of bricks. When the safe has cooled sufficiently, an examination is made. The next day the safe is placed upside down in the furnace and is again heated for one hour. An engineer watches the safe thru peep-holes for signs of buckling, sagging, collapsing, and so on.

On the third day the furnace is

opened and the battered safe removed. Every feature is examined, and finally an autopsy is performed; the safe is literally dissected. Samples of steel and insulating material are taken from various points and subjected to chemical and physical analysis. The final report on the safe makes mention of the results of all these tests.

Tests are made of fire doors, fire windows, vault doors and numerous other devices in a manner similar to the test made of safes. In the case of the test of a fire door, however, the door is subjected to heat according to the standard "time-temperature" curve,



Part of the test of a 2½ gallon foam-type extinguisher. The charge delivered by such an extinguisher is usually sufficient to extinguish a gasoline fire in this tank.

for one hour. The temperature of the furnace at the end of the hour is 1700° F. The panel is then removed from the furnace and a hose stream is played against the door for one minute. A careful examination by experts determines whether the door shall be given the label or not.

The work of fighting fires consists of two elements—detection and extinguishment, both of which have led to the invention of numerous appliances, some of them automatic and others operated by human agencies.

Let us first examine the detection devices. Many of these devices are operated in connection with sprinkler systems and are tested in the hydraulic laboratory. One system of fire detection operates in the following manner—the device consists of continuous hollow metal tubing which is placed thruout the building. One end of the tubing is connected to a small device containing a metal diaphragm. When the rate of rise in temperature exceeds a certain figure, the diaphragm is deformed, closing a circuit and causing an alarm.

The principal work of the Hydraulic Department, however, lies in the field of automatic sprinkler protection.

Automatic sprinkler equipment is undoubtedly the greatest single factor in reducing fire losses. Recognition of this fact is given by the insurance companies in the form of large reductions in premium rates for approved installations of automatic sprinkler systems.

The little sprinkler head that we have all seen is made the subject of many tests to determine its fitness for use. It is tested for its "accuracy of release" by placing it in an oven and raising the temperature according to a predetermined standard time-temperature curve. The temperature at

which the head operates and the manner of operation are both important. Uniformity of operation is determined by employing 150 heads in this test.

The severity of the tests may be judged when we learn that out of thousands of heads submitted, only about seventeen are now approved.

The subject of sprinkler installation includes also piping, valves, water supply, fire pump, and so on. All of these receive their share of attention.

In sprinkler installations where the temperature is likely to fall below the freezing point of water, air is used in the system above the frost level. This necessitates having a valve in the line which will be a combination air and water valve. This type of valve is called a dry-pipe valve and with all its connections and fittings, forms one of the most complicated parts of a sprinkler installation.

Underwriters' Laboratories is in close contact with the electrical industry. In this phase of their work, they fix and maintain standards of quality which are supported by construction and service tests and by manufacturing inspections. In this, as in all their work, Underwriters' Laboratories co-operates with the manufacturer to obtain the best results.

During the last year a great deal of work has been done with the gas-filled glow tube used in advertising signs. Conferences have been held with manufacturers and a booklet of specifications is to be published in the near future.

Much more could be said concerning the work in the Electrical Department, but it is such a great subject that a large amount of the material must be omitted.

The most active part of the Gases
(Continued on page 114)

MODERN LIGHT PAINTING

By R. H. Harridge

Illuminating Engineer, Curtis Lighting, Inc.

THE lighted exterior of a building at night establishes its name and memory in the minds of thousands who would otherwise miss a full appreciation of its decorative beauty. Floodlighting is an effective means of dignified publicity, and a beautiful, well-lighted building bespeaks the integrity and progressive-ness of the organization using it.

Upon a correctly floodlighted building the beams are projected over the surface with such an intensity that it is in strong contrast with the appearance of surrounding objects. This light must strike the surface of the building so that a part of the light will be reflected back to the eyes of the observer, for it is this reflected light which determines the positive effectiveness of a floodlighting installation. In order that a maximum amount of this reflected light may be secured, the building surface should be of a rather light color and have a matte finish in preference to a glossy one. The former reflects the light evenly over the entire surface, while the glossy finish will produce a more or less streaked appearance.

Different systems of floodlighting are used on various types of architectural construction. The most common is *straight floodlighting* against a flat surfaced plane. The floodlighting projectors are either installed upon another support some distance away (often another building) or are mounted on a convenient marquis of the building itself, and the surface of the building is covered with evenly distributed illumination. This type of lighting is most suitable for large

buildings which will attract attention primarily because of their size in comparison with the surrounding buildings, or for buildings which have few protuberances on their faces.

One of the best and most famous examples of straight floodlighting is that of the twin Wrigley Buildings on Chicago's *Boul Mich*. These brilliantly lighted buildings stand out like beacons on the night skyline at the highest point of one of the world's most famous thoroughfares. For ten or twelve miles in all directions the glistening tower is visible at night. The structures seem fairly to leap from the darkness and command attention and admiration from all.

The buildings, standing 450 feet from the river's edge to the tower's dome, are finished in white enameled terra cotta which at night is set shimmering by a light barrage from 402 powerful projectors consuming 180,000 watts. The average home could be lighted for about twenty-five years with the power used to floodlight this building for one evening. The projectors are grouped in banks located on other buildings across the boulevard and across the river 700 feet away.

The individual architectural features of other buildings render them admirably suited for another type of floodlighting known as *silhouette* lighting, where gorgeous contrasts of light and shade may be achieved. Buildings of this type have large window areas and often columns extend upward



The illuminated spire of the First Methodist Episcopal Church, in Chicago, is an example of both the silhouette and straight systems of flood-lighting.

from the street level for several floors.

Floodlighting projectors, mounted at the base of the windows may be concealed in flower boxes, or convenient niches provided especially for this purpose. The light is directed upwards to light the upper part of the window and the frame about it. The columns then appear in silhouette from the street.

Another place of concealment for floodlighting projectors is in urns or behind balustrades. The beams of light are then directed on the columns in such a manner that they themselves are brightly lighted while the space between them is left comparatively dark. Again, if the columns are several feet in front of the main building, the lighting equipment may be so installed as to illumine the main wall surface, against which the dark columns stand out in relief.

The esthetic possibilities of silhouette lighting are nearly unlimited and largely depend upon the ingenuity of the illuminating engineer. One of the best examples and one which is unique

is the spire of the First Methodist Episcopal Church high above the "Loop" in Chicago. Above twenty odd stories of offices this tower, in Tudor Gothic architecture, points heavenward, a golden finger.

The lighting of the steeple is in reality an application of both silhouette and straight floodlighting. The base of the tower is brought out in relief by the light from projectors concealed behind the buttresses while the shaft and cross are flooded by equipment installed on brackets on the tower proper.

In this particular case the problem of illuminating the spire was solved in the laboratory by means of an architect's plaster model. The tower was equipped with small battery lamps and illuminated with miniature floodlights from various relatively distant points to determine the intensities and positions of the units for lighting various portions of the spire. This is a most satisfactory method of engineering when models are available. It was thus possible, even before the idea was adopted, to visualize the exact effect which would be obtained in the actual installation.

The greatest difficulty encountered in the actual installation was that of adjusting the floodlights. In order to produce the desired effect it was necessary to place men on adjacent buildings who signalled to workmen on the tower the result of the light from each individual projector.

The installation consists of 196 projectors consuming approximately 70,000 watts. One hundred and twenty-four of these are mounted on the tower and seventy-two on the spire. Eight are mounted just below the cross, which is 15 feet high and 7 feet wide. The top of the cross is 565 feet above the level of the street.

Under favorable weather conditions the cross can be distinctly recognized at a distance of three miles and the tower is visible twelve miles away.

These two examples show to some extent the scope of the field of floodlighting. It is commonly acknowledged that the work of an architect in designing a building is not entirely completed unless he has made provisions that will accept the application of floodlighting, should the owner so desire.

One of the first considerations to be given to a building designed for floodlighting is the color of the material, which must be such as to reflect a large amount of light. The effect of the shadows cast by the light must next be considered, for the light will strike the face of the building either perpendicularly under daylight

conditions of from below during the time of night illumination. The day shadows will be completely reversed at night, and if this is not taken into consideration the building may take on quite an unnatural appearance at night, with grotesque shadows marring the effect. A third consideration, equally important as the other two, is the provision for proper space for the lighting equipment in locations from which the light may be directed most effectively.

By far the most satisfactory condi-

TWENTY years are required to bring man from the state of a plant, in which he exists in the womb of his mother, and from the state of an animal, which is his condition in infancy, to a state in which the maturity of reason begins to make itself felt. Thirty centuries are necessary in which to discover even a little of his structure. An eternity would be required to know anything of his soul. But one moment suffices in which to kill him.

—I'otaire.

tions in engineering a floodlighting installation occurs when the architect and illuminating engineer work together from the inception of the building plans.

The interest of architects in exterior lighting, particularly color lighting, has increased tremendously in recent years. It has been predicted by competent authorities that on main thoroughfares in our largest cities, street lighting will in time become unnecessary, so brilliantly floodlighted will be the buildings which flank them on either side!

Imagine the majority of our largest buildings in twenty years, softly glowing each night with shifting patterns of colorlight which will rival the aurora borealis. The dark caverns of our city streets will be transformed into brilliant fairyland avenues, slowly changing in various hues, from soft tints to deep shades, with such artistic treatment in light and shade of the architectural features of each individual building front that the natural effects of daylight itself will be surpassed.

C. & N. W. COMPLETES TRAIN CONTROL INSTALLATION

With the completion of an automatic train control system, extending from Chicago to Omaha, representing an outlay of three million dollars, all Chicago North Western passenger and freight trains on the main line will pass under an invisible master control that is absolutely automatic. It holds the speed of all trains within proper limits independently of the engineer or train men at all times. Under any and all conditions of the weather, day or night, it safeguards the movements of all trains and provides engineers with a constant check as to speed, and the condition of the right of way ahead entirely independent of block system signals which are often obscured by fog and thereby sacrificing speed for safety.

The new system allows an engineer to operate his passenger train as usual but at a speed within range of safety, if the track is clear, not greater than seventy miles an hour. The maximum speed for freight trains by this system of control is fifty miles per hour, if the track is clear, but no faster. Should an engineer approach too closely to a train or other unexpected restricted conditions ahead, the invisible master control causes a warning light in the cab to change from green to yellow, at the same time sounding a chime or shrill warning whistle which demands acknowledgment.

This double automatic warning of light and sound must be immediately acknowledged by the engineer in charge of the train. The speed of his train must forthwith be reduced to below twenty miles an hour, to prove his complete mastery of conditions, otherwise the brakes will be automatically applied, the control taken from his hands and the train stopped. As soon as the track ahead is clear again, the master control signal informs the engineer of the fact, whereupon he can again proceed at full speed ahead, up to within the required safety margin of seventy miles per hour as before.

For this installation, over 350 locomotives and 1050 miles of track had to be equipped with the control apparatus. It is reported that the installation will be complete and ready for service, May 1, 1928.

If I had my life to live over again, I would have made a rule to read some poetry and listen to some music at least once a week; for perhaps the parts of my brain now atrophied would thus have been kept active through use.

—Darwin.

THE ARMOUR ALUMNUS

J. WARREN McCAFFREY, '22, Editor

Alumni Hold Big Aviation Banquet.

THE twenty-seventh annual reunion of the alumni of Armour Institute of Technology was held on the eve of Washington's birthday in the Louis XVI of the Hotel La Salle. The comments that followed the affair were such as to bestow upon the banquet the description of "the best and most interesting banquet we have ever had." The one detracting feature was the absence of a number of alumni who would have enjoyed the program very much. In this connection, however, they did not receive much sympathy from those who were present. Many were the remarks heard that it was a shame there were not more of the alumni present to listen to the splendid program that was given, and in every case, further consideration of the absences was discharged with the remark, "Well, it was their own fault because they missed the most interesting program we have ever had."

MAJOR LANDIS PRINCIPAL SPEAKER

The principal speaker and guest of the evening was, Major Reed Landis, Chicago's own War Ace, who gave a talk on aviation, some of the requirements necessary for the right progress to be made in aviation, the part Chicago should play in this progress, and some interesting narratives of his own experiences during the war. To repeat his own expression, we are to take his title of War Ace with "a grain of salt" because he acquired that title while seeking to avoid death—in which adventure he destroyed two German planes and one balloon after he had fallen from the air formation of which his plane was a member, when beset by enemy planes. However, we suggest to take his remarks with "a grain of salt" and rely on the fact that the defeat of twelve planes and one balloon distinctly speaks for itself and entitles him to the honors properly given him.

Speaking in the interests of Chicago as an airport he said, "We must keep Chicago the air transportation center of the United States." "We should make it the air manufacturing center. Aviation affords a business opportunity to every man in his own line of work. Modern merchandising, selling and servicing methods must in the future be applied to airplane manufacture." He continued, "We need more

WHEREAS, Armour Institute of Technology has been a pioneer in the field of aviation, being the first school of record to offer a course in aviation, in the year 1910, and continuing with an unbroken record of classes down to the present with more students enrolled in the course each year, and

WHEREAS, aviation is a direct development in the engineering field and Armour Institute of Technology is exclusively an engineering college and greatly interested in anything pertaining to engineering and particularly when the same is for the better and greater development of Chicago, and

WHEREAS, there is a very urgent need for an airport close to the business section of Chicago and such a location is being provided for by the South Park Commissioners by making a landing field out of one of the proposed harbors, namely Harbor Number Three, for which there will be no apparent immediate use, which filled-in land will extend between about 16th and 31st Streets, and

WHEREAS, everything is in readiness for the construction of this airport but the necessary ordinance by the city authorizing the South Park Commissioners to go ahead with the work,

THEREFORE BE IT RESOLVED, that Armour Institute of Technology in a sincere and earnest interest in aviation and the development of Chicago as an aeronautical center, does hereby urge the Mayor and City Council of Chicago to see that the proper steps be taken for the ultimate passing of such an ordinance or ordinances as are necessary.

AND FURTHER BE IT RESOLVED, that Armour Institute of Technology endorses the work of the South Park Commissioners on this project for an airport and earnestly urges that when authorized to act for the people of Chicago, that they prosecute the work diligently for the best interests of the community and our fair city.

airports in Chicago and more emergency landing fields along the route."

IGOE GIVES PARK PLAN

The South Park Commissioners, all of whom had been invited, were represented by the Honorable Michael L. Igoe, State Senator from the fifth senatorial district and auditor of the Board of South Park Commissioners. In opening his talk, which was to describe to us just what the plans were for the lake front airport, Mr. Igoe suggested that Major Landis was certainly a wonderful advertising man and could do much in the interests of aviation in Chicago because, "he cer-

tainly sold aviation to us here this evening." Mr. Igoe told of the plans of the South Park Board to convert Harbor Number Three in the lake front development program as approved by the Chicago Plan Commission, into a landing field because there is at present no apparent immediate use for that basin as a harbor. This tract of land when made by the filling-in process will lie between 16th and 31st Streets on the lake front. However, in order to go ahead with this work, state ordinances are required to be passed authorizing the South Park Commissioners to proceed with the work and the consent and approval of the plans will have to be obtained from the Illinois Central and Michigan Central Railroads and also from the government. In preparation for this work, Senator Igoe explained that the General Assembly had already enacted the necessary legislation to permit the South Park Commissioners to carry out these plans and to authorize them to construct the airport, which was not within the previous scope of the park board's authority.

RESOLUTIONS URGING SUPPORT ADOPTED

At the conclusion of Mr. Igoe's talk, resolutions were offered verbally from the floor to the effect that Armour Institute of Technology and its alumni were in hearty accord with the plans of the South Park Commissioners and because of their great interest in aviation and the development of Chicago as an aviation center, appealed to the Mayor and the City Council that the necessary ordinances be prepared and submitted to allow this work to go ahead. Copies of the same were also sent the railroads mentioned and the South Park Commissioners. The resolutions were received heartily and unanimously by the entire assembly and President "Bob" Harper requested that the executive secretary draw up formal resolutions and submit them in the name of the Alumni Association to carry out the spirit of those assembled.

At this point in the aviation program, Armour Institute came into its own through the persons of H. Ralph Badger, '08, and Professor M. B. Wells. Badger had several ideas in

regard to the possibilities of Chicago in the field of aviation and the entire purpose of his talk was to bring his audience to a consideration of the points he left with them. He pointed out in detail what Buffalo had done in the creation of its great airport and what other leading cities in the United States were doing in aviation and left it to us to draw from inference the tremendous possibilities that lay at Chicago's choosing. His talk was very inspiring to the alumni because he was one of us, and because of his great work in the interests of aviation. He worked zealously for the Buffalo airport and is President of the Airport Publishers, and Publisher of the *Aeronautical Review*. He was also instrumental in the raising of \$100,000 fund for the landing field in Schenectady. His active interest in aviation throughout his own state has merited for him the distinctive position of New York State Governor of the National Aeronautical Association of the U. S. A. He came all the way from Buffalo expressly to be with his old college-mates and to talk on a subject in which he is so vitally interested.

Professor Wells, who has been in charge of the aeronautical courses and airplane design at Armour Institute since its inception in 1910, told of the unusual work that had been done at our alma mater in furthering the engineering of aviation. Professor Wells likewise had some interesting experiences to relate. He told about Armour Institute being one of the four technical schools in the country authorized by the government to give the Naval Ground School Course and of the interest manifested by the government in sending to our automotive laboratory eight new airplane engines.

To many of the alumni present the activities of Armour Institute in the field of aviation was entirely unknown heretofore and they received the information with great enthusiasm. Because of the great work the school has done in aviation and because of the activated interest of the Institute and its alumni in the development of Chicago as the aeronautical center of the United States, the initiating of a movement for an airport and the passing of resolutions to that effect was timely and well directed.

Another interesting talk was given by Dr. Raymond, our president, who told briefly of what was going on at 33rd and Federal and just what was expected to be accomplished during the coming year. This message from Dr. Raymond was well received by the assembly as are all of his talks.

EUROPEAN TOURS

Among the European tours offered this summer are three of special interest. These are the tours of the American Institute in Munich, the Midwest Power Conference, and the Mentor tour.

The Mentor tour is perhaps of greatest interest to Armour men because it is again conducted by Dr. George L. Scherger. During this trip Dr. Scherger will give frequent lectures on the country passed through. His knowl-



edge of and ability to portray the art, history, and culture of the European countries makes this tour most inviting.

The party sails from New York on June 23, and starts the European journey in Oslo. In the 68 days of the tour, the party will pass through 11 countries. The trip leads through Sweden, Denmark, Germany, Holland, the Rhineland, Switzerland, and Italy. At Interlaken the party will view the majestic Jungfrau. Four days will be spent in Rome. The party then proceeds along the Riviera, then through France, Belgium, and England. All along the way, stops will be made at interesting places. From Paris there will be excursions to Versailles and Fontainebleau; from London, a Windsor and a Shakespeare excursion.

The party returns from Southampton on August 21. The price of the tour is \$1,050; this covers steamship passage and all necessary party expense in Europe.

The American Institute in Munich under the competent direction of Doctor Franz Anton Pfeiffer, prominent in public affairs of Bavaria, has arranged a most interesting trip for next

summer consisting of a sea journey of 7,200 miles on board the steamship, New York, of the Hamburg-American Line, Germany's most beautiful and modern ship, and a land journey of 1,800 miles. Three European countries, Germany, Austria and France, including 7 of the 18 free States of Germany will be visited. The party will see some 40 European cities and towns, 8 of the most famous art galleries in Berlin, Dresden, Nuremberg, Munich and Paris, 7 of the most beautiful cathedrals and 14 well known palaces and castles such as the palace of Friedrich the Great in Potsdam, the Saxon's King's palace in Dresden, the Royal Residence in Munich, the Heidelberg Schloss, Versailles, etc. Many noted museums will be visited.

The whole journey will last 66 days, from July 7 to September 10. Four weeks of this time are to be spent in Munich where lectures in English will be given on the Geography, History, Art and Political Science of Germany. From Munich trips will be made into the Bavarian Alps, to the highest mountain in Germany, the Zugspitze, to the Tyrol and to the picturesque castles of Louis II, King of Bavaria. At the end of the summer will come a journey up the Rhine and a visit to Paris. The total cost of the tour is \$695, payable in three installments.

A large number of engineers associated in the Midwest Power Conference are planning to go abroad on the International Power Tour. The party will sail from New York on August 18. While in Europe they will visit most of the large power plants and new developments in the various countries.

The tour will last six weeks and in conjunction with the visits to the various plants, several sight-seeing and pleasure jaunts have been arranged.

Several countries will be visited and the itinerary has been arranged with great care so that engineers who take this tour will have ample time to see the sights and scenic beauties of Europe.

Headquarters have been established by the Midwest Power Conference at Suite 656, 25 Broadway, New York, for the International Power Tour. Interested engineers can secure additional details at that address.

Further information on any of these tours may be secured from Dr. Scherger.

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Our Slogan: Make The Armour Engineer the best technical college publication in the country

*It is easy to dodge our responsibilities, but we cannot
dodge the consequences of dodging our responsibilities.*
—Sir Josiah Stamp.

ON Feb. 2 Dr. Michael I. Pupin was presented with the 1928 Washington Award at a joint dinner of five national engineering societies at the Palmer House, Chicago. The Washington Award was founded by John W. Alford in 1916, and is presented each year for notable advancement of human progress through engineering. A committee composed of representatives of the Western Society of Engineers and the four national societies of the civil, electrical, mechanical, and mining engineering professions chooses the recipient of this prize each year.

Dr. Pupin has received the degrees of doctor of science, doctor of laws, and doctor of philosophy in recognition of his contributions to science. He is a past president of the American Institute of Electrical Engineers; he was one of the founders of the electrical engineering department at Columbia University; he is now professor of electromechanics at Columbia.

Dr. Pupin is best known for his development of the loading coil which makes possible long distance telephony. He has also been prominent in the development of X-ray photography, rectification of alternating current, and tuned circuits as a means of selective tuning in signal reception; he also assisted in the development of a submarine detection device during the war.

ABOUT two months ago, General George W. Goethals, characterized by President Wilson as "the greatest living representative of the engineering profession," died at his home in New York.

In 1907, after five years of work in the construction of the Panama Canal, dissatisfied with the rate of progress, President Roosevelt ordered a change in the organization of the canal commission. This reorganization—the fourth in the five year history of the commission—saw the appointment of a new chief, Lieut.-Col. G. W. Goethals.

The foundation for the undertaking had been well laid—Goethals proceeded to build upon it. The problem of sanitation had been largely solved by Col. William C. Gorgas, who continued as a member of the commission. John S. Stevens, engineer in

Paul R. Anderson

Paul R. Anderson, '31, died Tuesday, February 14, 1928, from an acute attack of spinal meningitis, after an illness of about a week. He was well-liked by all who knew him. The whole college mourns his death and extends sympathy to his parents.

charge of construction before the appointment of Col. Goethals, had left an excellent organization. The important requirement was to keep the work in constant progress, to eliminate friction, to make the most of every day, every man, and every machine. This requirement was met so well that the job was finished a year ahead of schedule.

General Goethals was not the man who visualized the cutting through of a continent, nor does he stand alone in the final triumph—he stands rather as the executive who gathered in all the forces and talents and welded them into a powerful machine—and drove them forward to an epoch-marking success.

RISKS are universal. For the orange grower, there is danger of a frost; for the cotton planter, the boll weevil; for the bond buyer, inflation; for the woolen manufacturer, tariff revisions; for the milliner, changes in style; for the contractor, strikes; for the railroad, Congress. The electric railway may be rendered unprofitable by the automobile. The phonograph may lose out to the radio. So it is the world over. Every business enterprise faces not only risks that are the common lot, but also risks that are peculiarly its own.

These risks are so various, and so large that in the United States in one year (1921) over 70 per cent of all business ventures failed; 25 per cent made only a bare living, and only 5 per cent made large profits.

What induced the 185,000 corporations in the country to carry on enterprises which yielded them nothing but a huge deficit? The answer is found in the record of the 170,000 others that realized a net income of more than four billion dollars. They all risked suffering losses in the hope of making profits.

Business risks are inherent in the nature of economic enterprise. They must be assumed by somebody. The farmer does not create the risks of pests and weather. Either he assumes these risks or, by means of insurance, shifts some of them to others. This is equally true of the risks that are assumed by the prospector, the miner, the merchant, the contractor, and the manufacturer. Unless somebody runs these risks, mankind will have to go without bread.

Every woolen manufacturer, for example, must buy wool. If he buys wool today, he may buy on a falling market; if he does not buy today, he may be forced to buy later at a ruinous price. If he borrows money in order to buy wool, he may not be able to pay the interest; if he postpones buying he may not be able to get the wool. If he invests in advertising, he may fail to get his money back; if he does not advertise, he may fail to sell his product. If he opens new mills where labor costs are lower, he may incur expenses which more than offset the gains; if he stays where he is, producers in more favored localities may take away his customers. Every day he must make decisions. Always there are decisions to run certain risks instead of others. Postponing a decision is itself a risk. In short, every business man is beset on all hands by risks; if he runs away from some, he is sure to run into others. Here is where good management asserts itself.

No business man is ever free to decide whether he will or will not escape risks. He can usually choose among risks; but choose he must. Profit is his reward for choosing wisely, and for good business management.—Adapted from PROFITS.

COLLEGE NOTES

Inter-Honorary Fraternity Dance Set for Friday, April 13

PROFESSORS WRITE ARTICLES

In the January issue of the Journal of the Society of Automotive Engineers we find mention of Armour Institute's participation in a series of tests for the measurement of knock characteristics of fuels. Nine laboratories employing widely different methods cooperated in the measurement of the knock characteristics of five selected motor fuels.

The laboratories cooperating in these tests were those of Armour Institute of Technology, the Atlantic Refining Co., the Ethyl Gasoline Corporation, the General Motors Corporation, the Standard Oil Co. of Indiana, the Standard Oil Co. of New Jersey, the Universal Oil Products Co., the University of Michigan, and the United States Bureau of Standards. These laboratories were selected largely because of the wide variety of experimental technique represented.

The method used by the Armour Institute of Technology is described in detail in a paper by Prof. Daniel Roesch entitled "Audibility Antiknock Tests and Knock-Intensity Evaluation." A four-cylinder engine is used and the spark is advanced until detonation occurs. The fuels are rated according to the spark advance necessary to produce a knock of any given intensity as measured by ear. Data were reported from engines of two compression ratios. In comparing the fuels the spark advance necessary to produce a given knock intensity was plotted against the volume of tetraethyl lead in cubic centimeters and comparisons were made by interpolation of the curves.

A paper giving a resume of the results of the tests made by the nine laboratories was presented at the annual meeting of the Society of Automotive Engineers at Detroit in January.

IN THE February issue of The Highway Magazine we came across a very interesting article written by Prof. J. R. Griffith entitled *Design Cost of Highway Bridges Reduced by Measuring Deflections in Models*. Prof. Griffith explains a method of measuring deflections in the laboratory by means of celluloid or cardboard models.

This was the method used in the design of the catenary structures and signal bridges of the Illinois Central Railroad's Chicago electrification in 1924. Prof. Griffith designed these structures and had the pleasure of applying, for the first time commercially, a method of analysis which he feels is destined to play a very important part in the design of statically indeterminate structures. Indeterminate designs of unusual attractiveness and economy have been rendered economical of computation by this method now being used in many highway and railroad bridge offices.

Professor Libby, as chairman of the educational committee of the American Society of Refrigeration Engineers, is doing educational promotion work for refrigeration men.

INTER-HONORARY DANCE

The Honorary Fraternity Council is busy at the present time planning the Honorary Fraternity Dance. The date for the dance has been set for Friday, April 13.

This is always one of the best informal dances of the year. It is exclusive, as only the members of the honorary fraternities are allowed to attend. Thus the attendance at the affair is largely composed of seniors, a few fortunate juniors and the alumni of the honorary fraternities.

Get your dates now and don't miss this splendid affair. The place will be announced shortly and don't forget the lucky day, Friday, April 13.



On Feb. 17, Mr. L. O. Armstrong, of the Bureau of Commercial Economics, presented a motion picture talk on "Whales and Sea Lions" at an Assembly. The films and slides shown by Mr. Armstrong were very instructive.

Mr. Armstrong is a well known outdoor man who has spent many years exploring the northern part of the United States and Canada. The Bureau of Economics, which sent him to us, is an educational institution; although not a government organization it cooperates with the governments of some thirty countries in a general dissemination of knowledge of other lands. Mr. Armstrong's address was well appreciated.

On Tuesday, Jan. 17 at 11:30 the assembly hall took on the appearance of an engineering gathering. Word had gone about that this was to be an illustrated talk and this appeals to the student engineer. Needless to say, the assembly hall was taxed to its capacity.

Mr. J. O. Perrine of the Department of Development, American Telephone and Telegraph Company, presented a talk on "Television." The talk was not only illustrated with pictures but with actual apparatus in operation as well.

Mr. Perrine outlined and demonstrated the fundamental problems encountered in the development of television and suggested their possible solution. His explanations of these problems were very interesting. As Mr. Perrine completed his talk the student body felt that it had a definite and clear conception of the operation of television.

NEW BOOKS IN THE LIBRARY

BENNETT, JAMES O'DONNELL. *Best Beloved Books*. The material in this volume appeared from time to time in the Chicago Tribune. It is an appreciation of books that particularly appealed to Mr. Bennett.

BROWNELL, BAKER. *New Universe*. An attempt to describe man's physical and spiritual development, written by the professor of contemporary thought at Northwestern University.

CHASE AND SCHLINK. *Your Money's Worth*. The authors give many enlightening and entertaining facts about modern buying and selling, with accounts of quackery, adulteration and misrepresentation.

HORN, A. A. *Trader Horn*. An exciting narrative by a young Englishman, telling of his travels in Africa, among the natives. His initiation into the ivory trading, gorilla hunting, cannibal rites and the ways of the pygmies make good reading.

LEE, W. T. *Stories in Stone*. One of the best accounts of the geology of western America, giving the reader a very good idea of the geological changes that have produced the scenery of that part of the country.

RICE, LOUISE. *Character Reading from Handwriting*. The second section of the book is a history of handwriting. "Grafitti" or primitive pictures show how architecture of every age has closely followed forms of the alphabet. The first section is at least amusing.

SIEGRIED, ANDRE. *America Comes of Age*. After visiting and traveling in America several times, Mr. Siegfried has written an extensive survey of American institutions. The European viewpoint on our race relations, industrialism, politics, prohibition, and religion is a valuable contribution to the study of our civilization.

The following titles may appeal to those interested in aviation:

BURGESS, C. P. *Airship Design*.

PAGE, V. W. *Modern Aircraft*.

WRIGHT, E. C. *History of Aeronautics*.

WARNER, E. P. *Aerostatics*.

WARNER, E. P. *Airplane Dynamics*.

WILLIAMS, A. *Conquering the Air*.

On Friday, February 10 at 11:30 Armour held an assembly in honor of Abraham Lincoln. The speaker was Henry R. Rathbone, Congressman-at-Large from Illinois.

Mr. Rathbone gave an inspiring talk dealing with several phases of Abraham Lincoln's life. He was well qualified to do so as his father, Major Rathbone, had been a personal friend of Lincoln.

Mr. Rathbone pictured in a very vivid manner the happy frame of mind of Abraham Lincoln during the last day of his life. He gave a detailed sketch of Lincoln's activities upon that last day with a vivid and stimulating description of the assassination that evening at the theater in Washington.

The talk made the student body feel as well as hear the principles of life that Honest Abe so carefully followed.

FRATERNITIES

A friend is Nature's masterpiece—Hubbard

TAU BETA PI

The first semester initiation banquet was held on Tuesday evening, Jan. 17, at the Electric Club, Professor Freeman acting as toastmaster. The new men have already slipped into their places as full-fledged actives engaged in carrying on the work of the chapter.

On Wednesday evening, Feb. 1, the chapter had the pleasure of initiating Mr. E. S. Matthew for Montana Alpha at Montana State College. Mr. Matthew is a graduate of that school of the class of 1916.

The second semester election of officers was held on Feb. 9 and resulted as follows:
President,.....E. B. KAPKE
Vice-president,.....E. C. BACOT
Recording Secretary,.....H. O. SNEDIKER
Corresponding Secretary,.....R. K. LANGAN
Treasurer,.....W. W. KERR
Cataloguer,.....R. J. GUENTHER

Our retiring president, George Von Gehr, is to be congratulated for his work of the past semester. He has set a standard by which the accomplishments of the succeeding semesters may well be judged.

SPHINX

During the month of January we were rather busy initiating our pledges. The pledge period was brought to a successful close on Jan. 16 with the banquet at the Brevoort Hotel. At that time the following men were initiated: O. R. Besch, H. E. Eichen, and J. T. Even.

It is about time for our yellow and black pledge ribbons to be appearing on the worthy men who have been working on the Armour publications.

PHI LAMBDA Upsilon

On the evening of Dec. 29, 1927, Omicron chapter initiated three new members after a hectic pledge period. They were: M. P. Johnson, A. J. Stabovitz, and J. R. Yount.

The initiation banquet was held at the Indian Room of the Fort Dearborn Hotel and all present did partake heartily of the tempting viands brought forth.

The new members presented original and not yet published papers about matters of utmost importance to posterity. Weighty matters were discussed as for example: the manufacture of wheel bases in the automotive industry, or the new osmotic pressure sail boat, or the use of high explosives in obtaining cavities in cheese. The subjects were all treated with a profound knowledge of physics, calculus, thermodynamics and other sciences, thorns in the side of young aspirants for academic honors. A lively discussion took place about these yet untrodden paths of knowledge in which the alumni took an active part.

Members of the alumni also gave short talks about their experiences on the wings of fortune. The evening closed with everybody having "that satisfied feeling."

ETA KAPPA NU

Most of us are on the last lap now, determined to finish with characteristic vigor.

It was decided that a theatre party was in order after the successful "finale" of last semester. Accordingly, Delta chapter descended on the Selwyn on Mar. 1, and witnessed *Good News*. We were well pleased with this collegiate comedy.

We are looking forward to this semester's pledging, the Inter-Honorary Dance, and other activities which will follow in short order. Our good wishes for a successful semester are extended to all.



CHI EPSILON

Activities in Chi Epsilon have not been very numerous since the last issue of the Engineer, as times are generally slow just before the middle of the second semester.

We are planning to celebrate the fifth anniversary of the founding of Chi Epsilon at Armour on the evening of March 29. We expect to have a fitting celebration for the chapter, as we feel that Chi Epsilon means much to the alumni, active members, and underclassmen in the Civil Engineering Department. To the underclassmen, it should mean a goal to strive for, an end to reach; and, if they are good enough to attain that goal, an organization so managed as to bring honor to all within its scope. We active members try to conduct the affairs of Chi Epsilon so that no man will ever have cause to slight the honor it confers upon its members. A member of Chi Epsilon is not only a good student, he is an all around good fellow, and every underclassman should try to mould his life at Armour to comply with these standards.

PI TAU SIGMA

Delta Chapter of Pi Tau Sigma has already begun preparations for the annual convention of the fraternity which will be held at Armour next Fall. An alumni smoker for the purpose of stimulating alumni interest and cooperation in this undertaking has been planned for the latter part of February. The chapter is fortunate in having an unusually loyal group of alumni and faculty members who will no doubt stand it in good stead.

SALAMANDER

Salamander wishes to announce the initiation of the following men: C. S. Chandler, J. T. Even, H. L. Krieger, and A. J. Reed.

At the beginning of the year, it was decided that Salamander should honor in some fitting manner the student having the highest scholastic standing in the freshman class in Fire Protection Engineering. It was thought that a recognition of good work would result in more effort on the part of the men in the lower classes.

The first award made was a copy of Crosby-Fiske-Forsters "Hand-Book of Fire Protection." This was presented to A. C. Gunther at the first smoker of the Fire Protection Engineering Society.

One of our members, J. Thornton Clark, is no longer with us. Thornton finished his course at the end of last semester and is now working in Omaha.

PHI KAPPA SIGMA

Alpha Epsilon of Phi Kappa Sigma wishes to announce the initiation, on Feb. 11, of the following men: E. D. Anderson, D. L. Banta, A. N. Faupell, J. W. Hursey, W. M. King, M. C. Larkin, A. T. Schrage, E. G. Squires, Dean Urnston, H. B. Weis, and R. N. Wilson.

As neophytes these men enjoyed one of the greatest and most hilarious weeks of "hell" we have had for some time.

We are glad to start the new semester with another strong resolve not to leave the drawings, "lab" reports and so forth, until the last week of the semester; however, the situation is not yet serious.

An informal house dance was held just before the semester ended and a Pirate dance was given on Feb. 25 at which time Captain Kidd would have received some new slants on "Pirateering."

An alumni smoker will be held in the near future and we hope to again hear weird tales of Armour "as she used to be."

DELTA TAU DELTA

Now that the half way mark has been reached, we are looking forward to the new semester with anticipation. The active chapter numbers three less due to R. Butterworth, A. U'Ren, and P. A. Graf not returning. P. A. Graf has been graduated, but R. Butterworth and A. U'Ren expect to return in September. All three are working in the city.

We are eagerly awaiting the annual Delt Prom which will be held at the Blackstone. As the Northern and Western Division conference is being held at this time, many Delt notables are expected to be present. The Delt banquet the following night will also be well attended. This affair promises to be one of the outstanding events of the 1928 social calendar.

Bob Peacock is building a concrete road

(Continued on page 102)

ATHLETICS

Seniors win interclass track meet

BASEBALL

Coach Bill Kraft had his prospective team out for a talk and get together the first part of February. Since that time the pitchers and catchers have been working out in the gym to work up the old throwing arms and generally get in shape. The outdoor practice will soon be under full sway on Ogden field.

The lettermen of last year are Capt. Rossetti, Simpson, Gent, Edstrand, Jennings and Reichle, while Newstrum and Menge were awarded minor letters. It has not been announced as to who the team will be this year altho these men will of course have somewhat of a start due to their past work. However, if there are any new men who desire to try their skill with the team they should report to Coach Kraft. Hubie Osborn, the manager this year, has been working hard on a schedule. Watch the bulletin board for it and try to see a few games.

HONOR A SOCIETY

The Honor A Society has been working steadily along getting new members and preparing for the annual spring banquet for all the athletes in school. A committee has been appointed to look after this and they report that things are progressing very nicely. There are about ten members in the society now.

BASKETBALL

The basketball team has not been so hot in all of their games this year but some of the games were real thrillers. Considering the student body that has "supported" the team and the number of injuries and players ineligible, the team has done rather well. It is a bad thing for a team to have several men on the bench because of injuries but a coach who trains a team most of the season and then has them reported as ineligible has cause for worry.

They lost the first DeKalb game on fouls and were ahead for the entire second game until the last minute when DeKalb sank two baskets to win. In the second Y. College game an overtime period was required for Tech to win.

BOXING

The boxing team has been very busy in preparation for their meets. The team took a trip to Culver Military Academy on Feb. 18 but lost the meet. Captain Vic Poupitch won his match for Tech, beating his man badly. Most of the other matches were close, especially Larkin's. The men taking the trip were Caparros, Buehling, Larkin, Briggs, Poupitch, Mgr. Healy and Coach Smith. There are other meets scheduled for which we will announce the results later.

OUR VARSITY CAPTAINS

BASEBALL

Germini Rossetti

The baseball team, most successful of our major teams last year, will be led by Germini Rossetti. In case you have forgotten, the Tech team finished last season with a



Germini Rossetti

record of ten wins, three losses and one tie. To win baseball games someone must hit the ball and "Rosie" did to the extent that he finished the season with a batting average of .300. The only member of the team to exceed this mark was ex-captain Hoffer.

Rossetti is rather short and heavy set, being of Italian parentage. He was born August 10, 1904, in Chicago, where he went to school. He graduated from Crane Tech, but was not interested a great deal in athletics while there. Since coming to Armour he has won the coveted major A for his work at shortstop. In his freshman year Rosie played on the interclass championship team which cleaned the school. We at first thought that we had lost him when he failed to return to school this fall, but after a semester of work he is back with us all ready to start another successful season. Rosie is a junior taking the Mechanical Engineering course, a member of the A. S. M. E. and the Honor A society.

INTERCLASS TRACK

On Jan. 21 the seniors won the interclass track meet at the U. of Chicago. This is the first time in several years that a real interclass meet has been held in which all the men were allowed to compete. It was thought advisable to allow the varsity men to compete so those that entered were given handicaps to make the meet more nearly even. The winners of first place in the eight events were given gold medals by the school. Since the meet the senior class rewarded their men for their work by giving them white numeral sweaters. The final score was:

Seniors	33
Sophomores	22
Freshman	13
Juniors	3

Capt. Deiwert won both the mile and the half mile events. Don Paul won the shot and tied for first place in the high jump. Tracy, who has been out with the basketball team, won the 50 yd. dash. Among the freshmen to place were Fox, winner of the quarter mile; Timmerman, 2nd in the half; Kjellgren in the half; and Troy, who tied for first place with Skaer and Paul in the high jump.

TRACK

On Feb. 10 a part of the team entered the I. A. C. meet at the Riding Club. Capt. Phil Deiwert ran in the mile and placed sixth. Payne and Iverson ran in the half mile but did not place. This meet was more to give the men a strong workout against competition because a very strong field was entered. We had to abandon the idea of entering the College two-mile relay as there seems to be a dearth of good distance men about school. The team is now working hard for the Illinois Relay Carnival with hopes of placing a strong team there. It is expected that we shall have several indoor meets this year, probably at Bartlett gym.

We want all freshmen track men to come out for the outdoor season. The call will be issued soon at which time Coach Stag will meet his team and talk things over. We have lost several men and need new material. Come out and do your stuff.

SWIMMING

The swimming team under the leadership of Captain Bob Brown is getting down to business and has a bright future in prospect. After losing the first meets to Crane, 48-20, and Notre Dame, 40-19, they came back to win from Chicago Normal, 49-19. There are yet five meets to be contested and the team feels confident of a victory in all of them.

Brown has easily won first place in fancy diving in all the meets so far, with Stemple, Trognitz, Strach and Marhofer close behind him in the point column in the various other events.

SOCIETIES

It is well for a man to respect his own vocation.—Dickens

FIRE PROTECTION ENGINEERING SOCIETY

In the past the Fire Protection Engineering Society has had some very interesting and educational meetings. Men from every branch of the fire protection profession have spoken before the society and the undergraduates have enjoyed these talks and have looked forward to them with great anticipation.

The burden of securing speakers for these interesting, educational meetings, has in the past fallen upon the shoulders of the faculty. The officers of the Fire Protection Engineering Society realized the tremendous amount of work involved in interviewing prospective speakers and arranging a program for each meeting so they conceived of a plan which was put in operation and has worked successfully.

A committee was appointed to do this work. The year is divided into four periods and the topics they want discussed are determined before-hand; speakers who are well versed on the subjects are all listed and interviewed and if possible appointments are made. The work in this way is so arranged that each man on the committee, which is composed of four, has a comparatively easy task for he has to arrange for only one speaker every six weeks.

The committee is composed of four senior fire protectors, K. Parker, M. Horn, Harry L. Krieger and J. Even.

The society wishes to thank Prof. Finnegan and Mr. Holmes for their interest and co-operation in helping to make the society a success.

ARMOUR RADIO ASSOCIATION

The Armour Radio Association held a joint meeting with the branch of the American Institute of Electrical Engineers on February 16, when Mr. Burke Smith, of the Illinois Bell Telephone Co., spoke on "Recent Developments in Telephone Engineering." The talk, which was devoted principally to the transmission of speech over long distance telephone lines, was illustrated with slides showing the principles of operation of loading coils and line amplifiers or repeaters. Several phonograph records were played in order to demonstrate the effects of eliminating certain audio frequencies in telephone circuits, and to show that for satisfactory operation, it is necessary to transmit the frequencies from 125 cycles per second to 2800 cycles per second. This talk was particularly suited to the joint meeting as both the power engineer and the radio engineer are interested in telephone communication.

L. F. Pfeiler, '27, visited the station while in Chicago attending the Power Show and was interested in the new arrangement of 9NV. Mr. Pfeiler, who is employed by the Wisconsin Light and Power Co., frequently communicates with the Institute's station, 9NV, from his own station, 9EHS, at Sheboygan, Wis.

THE ARMOUR BAND

Armour's first band made its appearance at an assembly on March 29th, 1923. W. B. Douglas was the student conductor and Mr. A. E. Dean was the director. At its first appearance, its membership numbered about seventeen pieces and only simple marches were played. Since that time much progress has been made, for today the membership numbers sixty pieces and the band is capable of rendering music for any occasion, whether it be for a pep meeting, a concert or a dance. This progress did not come about in a short time, it was the result of work,



The first Armour Band—W. B. Douglas, student leader.

hard work on the part of the student directors and leaders.

The first student leader, as was stated above, was W. B. Douglas; with his graduation came the appointment of A. A. Anderson, who played first cornet. After Anderson's graduation came the present leader, Mr. George Rezac. Much credit is due these men for the work and time that they have devoted toward the band's success.

For the past several months, Mr. Rezac and the band have devoted much time and some hard intensive work in preparation for the Spring Concert; at that time they will present some unique selections both in the arrangement and presentation.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The end of the first semester finished a very successful period for the local branch of the American Society of Mechanical Engineers and the second semester opened with the promise of having a more interesting series of meetings.

The first week of the new semester gave the senior members an opportunity to assist at the Power Show and Conference. During this same week, on February 16, the seniors met Mr. Ernst Hartford, the secretary of the parent A. S. M. E. Mr. Hartford met the boys at the Stevens Hotel and gave a talk on the objectives of the A. S. M. E. and outlined some very helpful suggestions for the forthcoming meetings.

A new program of outside speakers promises a very interesting period for the local branch of the society, while a smoker, to be given later in the semester will lend itself to the enjoyment of the members.

We urge all those interested in the aims and topics of the society to come to the meetings, and assist and be assisted in the engineering field.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Since the last issue of the Engineer, the Armour branch of the A. I. E. E. has had some very educational meetings.

A. I. E. E. was very fortunate to have Mr. Perrine of the Research Department of the American Telephone and Telegraph Company speak before a joint meeting of all the engineering societies on "Television." His lecture was most interesting and was well illustrated. He showed how a picture could be formed by a series of light and dark spots or by a series of lines of varying intensity of blackness, this being the principle of Television. The lecture was illustrated by slides and actual laboratory apparatus, one piece of which was of special interest—a tube which was very sensitive to light rays of varying intensity. "Television," according to Mr. Perrine, is simply an application of some very old principles and will not become a common commodity unless something entirely new in principle is discovered.

Mr. L. Anderson presented an interesting movie at the regular meeting on Jan. 27.

FLASK AND BEAKER

The professional chemical society, Flask and Beaker, has progressed rapidly and even though it is young, it is bringing about the results which its founders had in view; namely, to create a closer relationship between the "chemicals" of the various classes.

Two smokers were held this semester in the organization's rooms—much smoke and bridge was enjoyed by all the members present.

Flask and Beaker's initiation banquet was held at Maillards on Feb. 9; a delicious meal and entertainment were the things that those present will long remember . . . and also the entertainment which was given by the initiates. Truly, the papers presented on modern research problems were very amusing and it is hoped that these fellow chemicals change their views a little before applying for a position.

Flask and Beaker is pleased to announce the following initiates: Leroy A. Kramer, Robert M. Brown, Henry Fabian, William Egan, F. LaPiana, and Albin Stabovitz.

ARMOUR ARCHITECTURAL SOCIETY

The day of reckoning has come and gone and in its wake has left a number of relieved freshmen. Massier Turk and his staff handled with great ease and ingenuity the mob of some sixty freshmen architects and brought about a grand success of the gala day of the year.

The white hat, green neckties and canvas gloves worn by the "frosh" caused much comment and laughter out at Armour in the morning and then after lunch, great excitement prevailed at the Art Institute and the evil hour was close at hand. The afternoon was spent playfully in the loop and in a

banana cart as several freshmen architects will relate. The bystanders enjoyed immensely the speeches urging another Chicago Fire and the signatures of certain prominent city officials on the bill brought about much mirth. The sojourn of a certain group in the Chicago Theater, however, was very short and they left under a heavy escort.

Small clay pellets were passed to the upper classes who were the audience for the modern vaudeville which the many groups of freshmen were presenting—obviously the acts did not continue until they became bore-some—not with such ammunition.

Shortly after the performance, the scene of action shifted to the banquet room of the Atlantic Hotel. Mr. Mullen, as toastmaster, introduced Mr. Alfred Shaw, chief designer of Graham, Anderson, Probst and White, who gave a very interesting and instructive talk. Mr. C. F. Kelly, dean of the School of the Art Institute, was the next speaker and spoke on the coordination of the allied arts, Architecture, Sculpture and Painting. Our own Professors Reid and H. Penn gave talks of a more personal nature. Adjournment followed and left something in the minds of the freshmen which they will long remember.

THE ARMOUR TECH RIFLE CLUB

Although a comparatively new organization, the Armour Tech Rifle Club is rapidly taking its place as one of the outstanding clubs of Armour Institute. The Rifle team won its first match (Armour vs. Parker High) by right of forfeiture.

As yet a permanent team has not been chosen, but will be selected within the next two weeks. This team, consisting of seven men, is to be chosen on the basis of an average high score and regular attendance at the range for practice. Among the most promising candidates are—S. Polaski, S. Janiszewski, J. Jacobson, W. Kerr, L. Ericson, W. Pore, H. Montgomery, J. Teker, L. Statkus, and G. Capaross. This by no means completes the list, as several of the members have not shot their scores as yet.

At the next regular meeting of the Rifle Club, Colonel Pearsall, U. S. A., is scheduled to deliver an address, which will be both entertaining and instructive.

Due to the great integrity and ingenuity of the rifle team, the members have been able to fire over ten thousand rounds of ammunition since the organization has been started. This is an achievement of which any rifle club should be justly proud. The club at present has over forty members, which is proof of its rapid growth.

STRESS AND STRAINS

After the Christmas vacation, we found ourselves without the services of our most capable director, Thornton Clarke. This was more of a predicament than would seem at first, since there was not an upper classman available to fill the position. However, we were very fortunate in securing Edward Craig as the new conductor—Eddy has had a wide experience in organizations of similar kind and this makes him very well fitted to fill this position and then, being a freshman he'll be able to be with the club for three (or more) years. The rehearsals we have had thus far, under his guidance, have borne out our judgment in appointing him.

With the coming of the new semester we have secured some new material to further round out the instrumentation—one of

the new and much needed players was a trombonist.

Stresses and Strains will play for the dancing which will be held in the gymnasium after the Spring Concert.

ARMOUR TECH MUSICAL CLUBS

Not since the concert in December, have the musical clubs appeared as a body, although the different departments have played at several of the assemblies. Each appearance of these different organizations is received with greater enthusiasm and the musical club prides itself in the fact that each successive playing shows a marked increase in quality.

Each of the organizations at present are busily preparing for the two concerts which are soon to be presented. The Spring Concert is the next official appearance of the club as a body. The Band has promised something unique in the way of band music, and the Orchestra, not to be outdone, will offer some interesting selections; the Glee Club will again thrill the audience with their masterful singing; and as for the Stresses and Strains, they'll have a double opportunity to show their "stuff," for they are going to play for the dance which will be held in the gymnasium after the concert.

Shortly after the Spring Concert comes the musical climax of the year, the Home Concert, which is given in the evening. At this concert all the organizations will appear in uniform. Each fraternity will sit in their box, which will be designated by their pennants, and then, between the appearances of the different clubs, each fraternity will sing their song. This idea of having the fraternities sing at the concert is a popular one at many of the largest universities. Last year very good cooperation was given and this year it is hoped to make it a bigger success.

GLEE CLUB

The Glee Club, this year, is still on the up-grade, gradually improving under the skillful baton of Dr. Daniel Protheroe. The club this year has shown itself to be superior to the clubs as far back as we can remember. This certainly is an interesting fact and makes us believe that with the same leadership and enthusiasm that has been shown, the following years will see Armour with a Glee Club which will be inferior to none. This is our ambition.

The Glee Club is composed of a large number of seniors who will graduate in June. It is up to the juniors and under classmen to carry on—and to carry on means to sign up and come to rehearsals. They are held on Thursday at five o'clock in the Assembly Hall, and Dr. Daniel Protheroe is the leader. Remember a small interest on the part of the student will pay large dividends in pleasure.

ORCHESTRA

Thoreau once said, "Success usually comes to those who are too busy to be looking for it." If that is true, then the orchestra may expect a most brilliant climax to its concert season for, in truth, it has been too busy in its endeavors to be looking for success. During the last few weeks rehearsals have been intensive in preparation for the coming concerts. It is the aim of the orchestra to ever increase the quality of its concert playing for its audiences.

The orchestra had the opportunity, on March first and second to play for a light

operetta, "Hearts and Blossoms" given by Professor Leigh's choir—this unusual opportunity was appreciated most highly by the orchestra for it is only on rare occasions that it is possible to show our musical talent to the outside world. The numbers rendered were well taken and this reception will act as a stimulus and give the players satisfaction that their work has not all been in vain.

FRATERNITIES

(Continued from page 99)

through twenty miles of virgin jungle located in Liberia, Africa. In his letters to the chapter his descriptions of the country and its attractions are read more than once. At present he has killed two leopards and a twenty-one foot boa-constrictor. Gamma Beta seems to be represented in the farthest corners of the earth.

SIGMA KAPPA DELTA

The most important event of this semester was the initiation on the twenty-fifth of February of the following men into Sigma Kappa Delta: George Gibson, William Manske, Harold Fox, Charles Hawes, Robert Kilbourne, Robert Kuterul, and William Penfold. We take great pleasure in welcoming these men. As pledges, they gave a dance for the actives and alumni at the Chapter House on Saturday, February 11, 1928, and in the course of the evening, interrupted the dancing to give a few minutes of entertainment in the form of a ballet dance. Personally, we'd just as soon see a good chorus—but that's a different matter.

Quite a few of the members enjoyed the Sophomore Dance at the Morrison, but not all of them enjoyed the rest of the evening, or morning, as it were. But we took advantage of the heavy fall of snow on Thursday evening, February 21, after the Wheaton game, when a sleigh ride party was held. We didn't all freeze, but had a real good time. Personally, though, we'd just as soon have them come in the summer time, and feel like asking Professor Libby to devise some scheme of refrigeration whereby this could be made possible.

Sigma Kappa Delta extends a welcome to the new students at Armour, and hopes they soon get the spirit of Armour and help carry on.

PHI PI PHI

With a feeling of satisfaction of another job well performed, Gamma chapter of Phi Pi Phi entered upon the second semester with a determination to even better their results in this new term. At this time, we are pleased to announce the return of Thomas Sullivan after an absence of a semester.

With an eye to new fields to conquer, the tri-chapter basketball tournament has been organized, with our chapters at Northwestern and the University of Chicago forming the other two corners of the triangle. The games should be very well contested considering the success of these chapters in their respective interfraternity tournaments. At this writing, no definite plans have been laid out for the social part of the second semester, but judging from those of previous years some of the affairs to come are: Dads' Banquet, Easter Tea, the Spring Dance, and the Seniors' Farewell Banquet.

(Continued on page 110)

THE ROOT OF TECH.

IT'S "SQUARE."

Man is the merriest species; all above him or all below him are serious—Addison

FORWARD MARCH

This, the month of the roaring lion, and of the bleating lamb brings to us also that day set aside to the memory of the patron saint of engineering—St. Patrick.

So, brethren let us bow our heads, and from Solomon, (ARMOUR ENGINEER, Mar. '24) let us read:

Psalms—7: 11.

Verily, I say unto you, my son, become not an Engineer.

For an Engineer is a strange being, and possessed of many Devils.

Yea, he speaketh eternally in parables, which he calleth Formulae, and he wieldeth a Big Stick which he calleth a Slide Rule, and he hath but one Bible—a Handbook.

He talketh always of Stresses and of Strains, and without end on Thermodynamics.

He showeth always a serious aspect, and seemeth not to know how to smile.

And he picketh his seat in the "L" train by the springs therein, and not by the damsel opposite him.

Neither does he know a waterfall, except for its power, nor a sunset but that he must turn on an electric light, nor a damsel save for her live load.

Always he carrieth his books with him, and entertaineth his handmaiden with steam tables.

Verily, though his damsel expecteth chocolates when he calleth, she openeth the package but to disclose samples of iron ore.

Yea, he holdeth his damsel's hand but to measure the friction, and kisses but to test the viscosity.

For in his eyes shineth a far-away look that is neither love nor longing—rather is it a vain attempt to recall a formula.

There is but one key to his heart, and that is Tau Beta Pi, and one love letter for which he yearneth, and that an "A."

And when to his damsel he writeth of love and smeth with crosses, mistake these symbols not for kisses, but rather for unknown quantities.

Even as a young boy, he pulleth a girl's hair to test its elasticity, but as a man, he discovereth different devices. For he would count the vibration of her heart strings, and reckoneth the strength of her materials.

For he seeketh ever to pursue his scientific investigations; even his heart flutters his counteth at a vision of beauty, and inscribeth his passion in a formula.

And his marriage is a simultaneous equation, involving two unknowns, and yielding diverse answers.

LOVE IN THE PRINT SHOP

"May I print a kiss on your lips?" I said.
And she nodded her sweet permission.
So we went to press and rather guss
We printed a full edition.

"One edition is hardly enough,"
She said with a charming pout,
So again on the press we placed
And we got some extras out.

A Shoppin' for Color

I want a little bit o' blue—
To match your lovely eye,
A little bit o' sparklin' blue,
Blue as the summer sky!

A little bit o' flashin' blue,
From Italy's cobalt sea—
A bit o' blue from the feathers,
Of blue-birds flyin' free.

A little bit o' dazzlin' blue,
Ah!—this silk mayhap compare?
No—never—this bit o' painted blue,
Is not near as nice, I swear!

But really dear, I found it—
This blue to match your eye—
I found it dear—I found it—
And sure it is—your other eye!
—ARAMIS.

PAGE STANDARD OIL

Mr. Kelly had a very neat sign on the board one morning, "Pep meeting. Everybody out." A few minutes later some wag had added,

"of Gas."

HORSE !!!

—power
—d oeuvre
—Throat
An enlarged pony.
For better or for ———
—Shoes
Spark Plug
—chewie!! (gesundheit)
—radish
enf—
Thanks for the buggy ride.

Stude.: Could you help me with this problem?

Prof.: I could, but I don't think it would be just right.

Stude.: Well, take a shot at it, anyway.

Flamingo.

CHANSON

O' odes are writ to ancient Rome,
Fantasies to loved ones dear,
But it's seldom that we hear the praise
Of the sweating engineer.

He potters with flasks and beakers
Filters his mud off clear;
The grass dissolving, stink evolving,
—chemical engineer.

Or there's the gunk at the valves and throttles,
Tuning an engine's cantankerous gear;
The thermo-damming, gas expanding,
—mechanical engineer.

Or look to the "gee" on the telegraph pole,
Strapped up by half an ear;
The spark evolving, then revolving,
—electrical engineer.

Take a look at the "man" in the leather boots
Measuring a moss-covered weir;
He's the rivet-tapping, moose-milk lapping,
—civil engineer.

Here's the engineer in a white-collar job
Inspecting, dissecting, far and near;
The risk detecting, hazard deflecting,
—fire protection engineer.

Last but not least, is the only artist'e
He hasn't a job (it's a career),
The air castle scheming, lost art redeeming,
—architectural engineer.

So odes are writ to ancient Rome,
Fantasies to loved ones dear,
But it's seldom that we hear the praise
Of the sweating engineer,
—the barb.

ELVES

My students sit as still as sheep
While I, their shepherd, try to teach them;
And they the same expression keep
Whatever ruse I use to reach them.

I speak in terms requiring skies—
It seems the walls prescribe their eyes;
I talk of universal forces—
For all I know they think of horses.

But when they leave my musty room
And find once more their proper selves,
I hear their voices through the gloom
As coming from a school of elves.
—WALTER HENDRICKS.

Traffic Cop: What's your name?
Truck Driver: It's on the wagon.
Traffic Cop: It's obliterated.
Truck Driver: Y'er a liar! It's O'Brien.
Burr.



Who will scout this industrial frontier?

WHETHER in the Bell Telephone Laboratories, in the Western Electric workshop, in the various operating companies or in the American Telephone and Telegraph Company, telephone executives are scouts on the frontier of new and better methods.

It is significant that your true telephone man, with the feel of the calling in his blood, never speaks

of having "perfected the art of communication." And this in spite of the fact that America, in fifty years, has telephones everywhere and talks far beyond its borders.

Work in the Bell System demands the bold curiosity of pioneers and the infinite pains of pioneers who, like Columbus, Lincoln and Lindbergh, prepared "and when their chance came they were ready."

Please mention The Armour Engineer

Scouting in research

Scouting ahead is accepted practice in the Bell Telephone System.

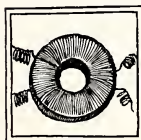
Research engineers are continually stepping over the borderline of new knowledge, seeking—and finding—the better way.

Scouting in management

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done is the fact that telephones are meeting an ever harder test from the public. People use telephones more, the number of calls per person rising from 34 in the year 1900 to 206 in 1927—or 505 per cent, while population increased 52 per cent, railroad passenger traffic 104 per cent, mail communications 292 per cent.



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THE INFLUENCE OF MINNOWS IN CONDENSERS

(Continued from page 89)

minnows is very close to one-fifth of an ounce. Some weigh more than others but the average weight of each is as stated. Thus, the total weight of minnow per gallon of mixture is four ounces or 1/4 pound/gal.

Much difficulty in collecting data for this paper was encountered, but most of all was it hard to get a good value for the average specific heat of fish. Many authorities were consulted about this. One of the professors of chemistry at Armour Institute of technology gave his opinion that the specific heat of uncooked minnow would be approximately 0.6574. He arrived at this value by taking from a Handbook of Chemistry the values for tanned leather and linseed oil, assuming the fish to be 40 per cent water and 3 per cent oil, and by using his good judgment for the rest. This method of determining such an important factor seemed hardly adequate. For this reason, the specific heat of minnows was found experimentally. The regular method of determining specific heat by cooling was

used. The fish used for this experiment was a mixture of Whitefish, Bullhead, Carp, Bass, Perch, and Sucker, it being thought that these were fairly representative of the lake fish. The resulting value was astonishingly close to the one obtained through the Chemistry Department.

The influence of the presence of minnows can now be easily determined. It has already been stated that the cooling water used at the present time is 60 pounds per pound of steam, and that the turbine requires 8 pounds of steam per kw hour. This means that for the Parsons unit alone, there must be 24,000,000 pounds of water per hour. This is equivalent to 2,875,000 gallons per hour, or 69,000,000 gallons per day. But this is with one-quarter of a pound of minnow in every gallon. The density of fish is very nearly that of water so the weight of fish per gallon of mixture would just displace an equal weight of water. Therefore

Part of mixture by weight, of	
fish	3.0%
Part of mixture by weight, of	
water	97.0%
	100.0%

To find the specific heat of the mixture of fish and water, we must multiply the specific heat of each substance by the amount of it in the mixture.

$$\begin{aligned} \text{Specific heat} &= (1.0000 \times 0.970) + (0.6499 \times 0.030) \\ &= 0.970000 + 0.019497 \\ &= 0.989497 \end{aligned}$$

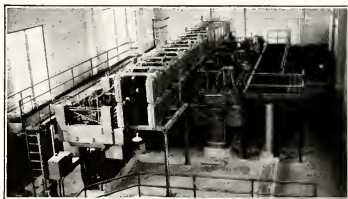
This cooling water with its low specific heat of only 0.989497 is not as effective as it would be if it were clean and had the ordinary heat of 1.0.

The quantity of water to do the same amount of condensing varies inversely as the specific heat. Since the quantity now used is 9,000,000 gallons per day, the amount needed if the minnows were not present would be

$$\frac{9,000,000 \times 0.989497}{1.000000} = 8,905,473 \text{ gal.}$$

In other words, a saving of 724,707 — 3/4 million gallons of water per day for the Parsons unit alone! The presence of minnows has an appreciable influence.

The well informed engineer who is interested in power plants can find in this problem more than enough to tax his brain to the utmost. It is for some man of the future to eliminate the influence of the presence of minnows in condenser circulating water.



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See Bulletin 2085

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CHICAGO HARBOR

(Continued from page 88)

cient volume an interchange terminal will be provided in Lake Joliet, a few miles below Joliet on the improved Des Plaines River. There connections may be made with the Elgin, Joliet, and Eastern R. R.

The barges to be used in the Chicago River traffic are intended to be of such a nature as to permit the fixing of all bridges. Interchange traffic in lumber, binder twine, anthracite coal, and lake sand and gravel is largely responsible for the opening of bridges and the consequent delays to land traffic. Of these only the lumber and binder twine traffic cannot find another route as good as the Chicago River offers. The direct and indirect cost of opening and maintaining movable bridges and delays to land traffic is estimated to be approximately \$3,000,000. In view of this figure and an almost certain policy of fixed bridges, it is inevitable that the lumber and twine trade will have to transfer their goods from the lake front by truck or lighter.

The program for initial construction calls for a car storage yard and transfer platform on the north side of the entrance to the Chicago River; the construction of tracks on the north

side of the center roadway at Municipal pier, including removal of street car tracks; and the joining of these tracks with those of the Chicago and Northwestern Railway on Illinois Street. It further calls for an additional breakwater on the north side of Municipal pier and the provision of connection with the Chicago Tunnel Company's system. Provision of car float service between car storage yard and the Illinois Central R. R. completes the recommendations for initial construction at the Chicago River harbor, the estimated cost being \$1,800,000. The construction of a double story pier on the south side of the entrance to the river is to come later at a cost estimated at \$3,200,000.

The first unit of the commercial barge terminal at Crawford Avenue and the drainage canal will comprise one 500 foot shed development at a cost of about \$1,300,000. This will include connection with the Belt Railway of Chicago and a ramp to Crawford Avenue.

The initial development of Lake Calumet barge harbor includes the construction of the harbor belt railroad and the marginal street for the length of the first unit. Only enough fill would be placed to start with for a single track railroad and a granite block pavement. The cost of filling

in submerged lands, including the expense of bulkheading is proposed to be carried by prospective lessees. The cost of this development, i. e., the railroad and the street, is estimated at \$1,250,000.

The advantages of the harbor plan as proposed are outstanding. The initial steps, to start the plan to completion, will cost \$4,500,000, which is a comparatively small amount considering the ultimate project. Expansion will be practically unhampered for an indefinite time. There is no conflict with the park program of the lake front. Interference of water traffic with that on land is sure to be a minimum. It is a great plan for a great undertaking.

In the words of Daniel H. Burnham:

"Make no little plans; they have no magic to stir men's blood, and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever growing insistency. Remember that our sons and grandsons are going to do things that would stagger us. Let your watchword be order and your beacon beauty."



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FRATERNITIES

(Continued from page 102)

Coupled with these social affairs and our new studies, there are initiations and spring athletics to keep us busy until next we are seen on these pages.

THETA XI

Theta Xi takes pleasure in announcing the initiation of the following men on Saturday, Feb. 18: R. A. Dolbeer, F. M. James, W. E. Schirmer, W. A. Schrader, and R. J. Serson.

A dance was given at the chapter house in honor of the newly initiated. Valentine decorations were carried out throughout the house. Everybody took this occasion to celebrate the finish of the first semester, half of the year's work.

Several members of our chapter attended the National Convention at Minneapolis, Minn., Feb. 24 and 25.

An alumni smoker was given at the house on March 2, the freshmen giving very clever entertainment. A faculty smoker was held the following week.

BETA PSI

The passing of one half of the school year indicates that only one half of the joys incidental to a year of fraternity life are over and that we may look forward to as many good times as we have had since last fall. Two dates are already marked on the

spring calendar. Feb. 26 will be Parents' Day and April 7 means a big dance at the Stevens. Probation week and initiation have been delayed because of a quarantine but the pledges must be rewarded and the precious badges will be bestowed on Feb. 25. After that time Beta chapter will be proud to announce six new members. Circus week brings added interests and in all we will have our hands full with outside activities.

A semester full of joys was saddened by the passing of a friend that we had known for a year. One so well liked leaves a mark that not even time can erase, and all who knew Paul Anderson join with us in expressing to his dear ones our sincere sympathies.

TRIANGLE FRATERNITY

With another semester just past and the spring semester (or whatever you wish to call it) now getting in full swing, Triangle Fraternity looks forward to another successful semester in scholarship and social activities.

On Feb. 5 the regular meeting of the National Council was held at the Hotel Sherman. On Feb. 14, the traditional custom of Alumni and Active Reunion was celebrated with a dinner dance at the Chez Pierre.

A new custom has been established in the form of a Father and Son's Banquet held at the Chapter House. The first one was held on Feb. 21. This establishes a closer relation between the parents of the active members and the Fraternity itself. No for-

mal program was arranged, but just a simple informal gathering where the Dads may talk, smoke, play cards or pool.

When spring time is thought of, the natural trend is to think of bright things but the pledges under probation have a dark look on everything during their two weeks of "hell." Probation was held from February 20 to March 3, the foolishness and stern commands were borne well and executed very creditably by our new brethren. At this time, Triangle Fraternity wishes to announce their three new brethren, Willard S. Denning, '30, Donald M. Fetterman, '31, and George Reuter, '31. After the formal initiation ceremonies, held on March 3, the whole gang gathered at the Webster Hotel for the initiation banquet. Talks by faculty members and actives, along with a good feed and smokes, made up a very enjoyable evening.

Also on March 3, the installation of Sigma Epsilon of Pennsylvania State College, was held.

As this article goes to press, the Armour Chapter is planning a St. Patrick's dance to be held March 31. On April 15, Founders' Day, Armour Chapter in conjunction with all other Chapters will celebrate the 21st year of organization of Triangle Fraternity. The National Council is considering the possibilities of a 2000 member day celebration.

April 26-27-28 are the dates of the 19th National Convention to be held at the Edgewater Beach Hotel, Chicago.

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joyful appearance of some individual returning from his vacation, we look back to that evening of February 3, when our celebration of the birthday of Sigma Epsilon of Sigma Alpha Mu took place at the Edgewater Beach Hotel. The dinner and dance will long remain in our memories as one of the most happy and fraternal affairs we have ever held. The details are really unnecessary; but suffice it to say that no one left without some feeling of exhilaration that he would never attain elsewhere.

RHO DELTA RHO

Having wintered the terrific storm of final exams, the boys are all back with renewed vigor to tackle the oncoming semester. Many preparations have been made for the new semester, especially in a social and athletic way. Having been successful in trouncing the alumni in their annual basketball game, the team has had a fairly successful season. The indoor team is already preparing to practice for the coming season. Tennis prospects are also bright for the first time in a long while.

The annual dance given by the actives in honor of the initiates is to be at the Parkway Hotel and the boys will all be out to be introduced to the alumni and their entourage. Brother Kieger has left school, but intends to continue at night school. Pledges Berger, Moskovitz, Bosches, Drill, and Kaynor at this writing are already partly through their agonies, and will soon be full fledged members. The alumni, actives, and pledges extend to the student body sincere wishes for a successful year.

KAPPA DELTA TAU

Socially, the second semester of the school year has had a very successful start for Kappa Delta Tau Fraternity. On Sunday

evening, February 5, a well attended student party was held at the home of Joel Jacobson and the following Saturday an outing to the Indiana dunes was given for the entire chapter. The party spent the night at the cottage of Louis Needleman, near Wilson, Indiana. The success of our social activities was marred only by the fact that three of our members have been forced to leave school for various reasons. Those who have left are Joe Elman, Milt Sachs, and Harry Stein.

FRIDAY, Feb. 17, is just a memory now but the feeling of deep satisfaction lingers on. The occasion was the Sophomore Class dance. The place—the Cameo Room at the Morrison Hotel, with Van's Society Orchestra inspiring the crowd with their fine music.

There are two reasons why this dance should be remembered. First and foremost, the dance was a mighty "keen" affair and second, the blinding snow storm that waged outside through the night was mighty cold. Notwithstanding the adversity displayed by the elements on that particular evening, the dance was well attended.

Joe Bechtold and his committee are to be commended upon the success of the dance. The place was ideal, the orchestra played well and pleasant memories of the dance will linger long.

The freshman class is preparing to announce its dance shortly. The place selected is the Lake Shore Athletic Club and the date is March 16.

Wagman, the freshman social chairman, and his committee are now concentrating their thoughts and efforts upon the selection of an orchestra. From the splendid hall room that has already been chosen and the activity displayed by the committee, we are confident that the dance will be a charming finale for the informal class dances of this school year.

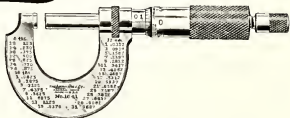
The registration at Armour for the second semester by classes and by courses is as follows:

	Senior	Junior	Sophomore	Freshman	Special	Total
Mechanical	26	27	33	43	1	130
Electrical	39	43	45	52		179
Civil	30	24	28	50	1	133
Chemical	12	13	24	23	1	73
Fire Protection	30	24	35	23		112
Architectural	20	21	43	49	1	134
Total	157	152	208	240	4	761



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And back of this, another picture—the Armour Kitchen in Chicago—the point of contact between you and your home, the ranchers and farmers, the buyers, dressers and processors of meat.

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A R M O U R A N D C O M P A N Y · C H I C A G O

UNDERWRITERS LABORATORIES

(Continued from page 92)

and Oils Department for the year 1927 was the Old Burner Division.

The work of this division has developed from nothing in 1922 to the most important division of this department in 1927. Over 100 names are included in the list of devices tested last year. A tentative list of specifications for oil burners was drawn up in 1926, and last year a standard was published for the first time. This standard has been favorably accepted and has thus far withstood the test of use without the necessity of revision.

The 1926 award of the Morehead Medal of the International Acetylene Association was made to Underwriters' Laboratories, in recognition of its services in standardizing and safeguarding acetylene equipment.

Another important part of the work of this department is in connection with devices for the storage and use of gasoline. Much of the work done in 1927 in this division centered around improvements and changes in existing devices.

The Chemical Department is equipped to take care of any kind of test that may be required. Part of the work of this department is known as "explosion work." In general, this

consists of a study of; first, devices designed to function in an atmosphere containing explosive or flammable vapors or dusts (for example, "explosion-proof" motors); second, hazardous materials which may yield explosive or flammable vapors (such as refrigerants); third, devices for the protection of hazardous gases or volatile liquids (flame arresters).

Chemical tests are made of the insulation of ordinary rubber-covered wire and also on the lining in ordinary cotton rubber-lined fire hose.

The Chemical Department is a very important factor in the work done by other departments, in testing materials and in determining the results of tests upon the chemical make-up of these materials.

Although the original purpose of the Laboratories had to do with fire hazard, the work of the Laboratories has gradually widened to include the field of accident and burglary prevention, and automobile safety as well.

In the field of accident prevention there are many things to look for. Ladder feet, saw guards, belting on machinery, window-cleaners belts, fire escapes, punch presses, scaffolding—all have received attention and have been made as safe as possible.

The Burglary Protection Department was developed in 1921 to balk burglars, who were constantly becoming more expert in their work, while the resistance methods were stationary.

Manufacturers were eager to co-operate with the Laboratories and developed their safes according to the suggestions made by the experts who had turned "safe-crackers" for the time being, and were thus learning the weak points of the vaults and safes.

The results of this work have been gratifying. If the modern safe-blower wishes to be a financial success, it will be necessary for him to take another course in the latest methods, for things have changed in his profession and a good living is harder to obtain now than formerly.

One of the most common ideas which the public cherishes is that the label of Underwriters' Laboratories on an appliance means that that appliance is "fireproof." From the very nature of things, such a condition is impossible. Imagine the fallacy of saying that an ordinary gasoline pump is "fireproof," simply because it bears a label. This does not mean that the label is there for no real purpose. It has a purpose, as I have endeavored to show. It means that the device to which it is applied has an inherent fire hazard, and that it has been safeguarded against this inherent hazard as far as is practicable.

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Volume XIX

May, 1928

No. 4

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Volume XIX

May, 1928

Number 4

To the GRADUATING CLASS of 1928

¶ A Letter from Dean Monin

Dufourstrasse 30,
Zurich, Switzerland,
March 26, 1928.

Gentlemen:

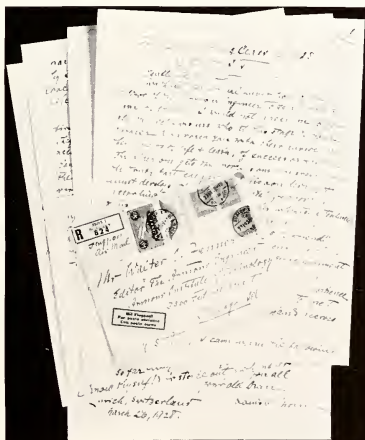
Without the cordial invitation of the Editor of the *ARMOUR ENGINEER* to send you a line of greeting I would not presume to join all the well-wishers who at this stage of your career approach you with their advice, with their views of life and death, of success or failure. The older one gets the more is one impressed with the truth that each man is his own destiny and must develop physically, mentally and morally according to his constitution, his inherited tendencies and his capacity for effort and self-discipline.

Therefore accept these lines of friendly talk as you accepted in the "Economic" class many a side-issue and many a passing comment on life, love, business and human affairs in general, with your usual good humored patience and youthful tolerance. I am delighted to meet you once more: truly a "hands across the sea."

Let us begin.

The other day I came upon the following passage in an English novel (*Deadham Hard*, by Lucas Malet. I have lots of time now to read love stories. You are yet in the fortunate age of life to live them!):

"The majority of men run in blink-



ers from first to last. Not that I underrate their usefulness. They are honest, painstaking, thoroughly reliable according to their lights. They do excellent journeyman work. But there lies the heart of the whole matter. Are you content to do journeyman work only? Or do you aspire of something greater?

"If the latter—well, the door stands open upon achievement by no means contemptible as the opportunities of

modern life go. But the world is so constituted that if you elect to *drive* rather than be *driven*, you must be prepared to take heavy risks, pay heavy penalties.

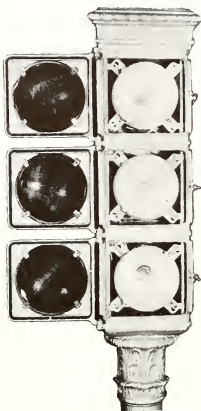
"The choice rests exclusively with yourself. Both ways have merit, both bring rewards. Only this — whether you choose blinkers, your barrel between the shafts and another man's whip tickling your loins, or the reins in your hand, and the open road ahead, *be faithful to your choice*. Stick to it, through evil report as well as through good."

So far my novel.

It is clear that a young man "just out of college" cannot expect to take the reins of any undertaking, business or engineering firm into his own hands right away. For a considerable time he will feel "another man's whip tickling his loins."

Be of good cheer and submit to it gracefully—as long as you hold firmly the reins of your character development, of your ambition, your working power in your own hands. Set the goal of your future activities high and firm. If you feel that you have the stuff in you of which leaders are made, keep your eyes on the trail that leads to the top. If on the other hand you do not wish to be burdened with too great and too many responsibilities

(Continued on page 138)



The CHICAGO TRAFFIC SIGNAL SYSTEM

By Chester S. Shaffer, '24

*Electrical Engineer, City of Chicago,
Department of Gas and Electricity*

PRIOR to September 1, 1925, the City of Chicago had in operation but two signalized intersections, with the exception of those equipped by the various park districts. Traffic was becoming so heavy throughout the entire city, and the constant drain upon the Police Department for its regulation so severe, that the Superintendent of the Police Department, in conjunction with the Chicago Association of Commerce, appointed a committee which conducted a number of traffic studies, and subsequently had its recommendations approved both by the Association of Commerce and by the Police Department. These recommendations were turned over to the Department of Gas and Electricity for the design and installation of the necessary equipment.

The Committee recommended that four traffic signals be installed at each two street intersection to be regulated, and six or more as needed at each three street intersection, and that the signals be placed as near as practicable to the curb and to the building line at which the traffic was expected to stop. The type of unit recommended for use was the two-way, three-color type, the green taking the top, amber the middle, and ruby the bottom position. These have proven satisfactory in most outlying installations, but due to the large volume of pedestrian traffic in the

Loop district, the signals in this area were later replaced by the four-way, three-color type, with short visors on the street side of the signal to reduce breakage by overhanging vehicles.

The traffic signal employed in all installations is of a distinctive type, the architectural features being the work of Graham, Anderson, Probst, and White; and the electrical and mechanical features, of the Department of Gas and Electricity of the City of Chicago.

The entire signal, which is made in sections for facility of alteration and repair, is of cast aluminum alloy. Each lamp socket, which is adjustable, and reflector, is held in an individual spider which directs the light at an

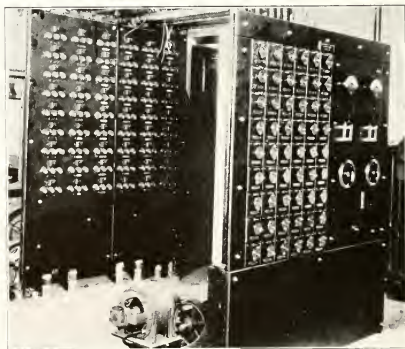
angle of three degrees below horizontal. A special silvered glass reflector, with a heavy copper backing deposited thereon, is very satisfactory both as to prevention of breakage and permanence of reflecting properties.

The signal head is supported on a five-inch steel pipe pedestal, which is securely fastened to a large flange, which in turn is bolted to the sidewalk or foundation. This flange is covered by an ornamental base casting of aluminum alloy. The space between the base casting and the post is calked with lead.

The mounting height of the three lenses is 7, 8, and 9 ft. All of the internal wiring of the signal is connected to a conveniently placed marked terminal block, which simplifies the work of installation. In the Loop district, 25 watt, 110 volt, mill-type lamps are used, and at outlying locations, 50 watt lamps of the same type.

There are six schemes of control in use by the City of Chicago. These are the two-way and three-way isolated intersection control, the remote control, the progressive control, the Loop district central station control, and the split control; the last named has been developed only recently.

The two-way and three-way controllers, for use in regulating traffic at the intersection of two streets or three streets, respectively, are essentially the same, the



Main control board for the Loop district, with the transfer and terminal board in the background.

only difference being in the number of contactors used. The two-way has four circuit-breaking contacts, one for the red north and south and the green east and west, one for the green north and south and the red east and west, and two for the two amber periods. The three-way has nine contacts, three for the red periods of each of the three streets, three for the green periods of each, and three for the amber periods.

Originally the timing unit consisted of a rocker arm actuated by two solenoids. With slight modifications this was adaptable to either direct or alternating current supply. These have since been replaced with the disc type of induction motor in the alternating current district, and with a small direct current motor in the direct current district.

As in the case of the signal head, the controller leads are brought to a terminal block on the inside of the totally enclosing cast aluminum housing, which is mounted at a height of 4 ft. 4 in. on the same type of pedestal as used for the signal.

The remote controller is a relay operated circuit-breaker, which is connected to the nearest source of power, and to the standard controller from which it receives the timing impulses.

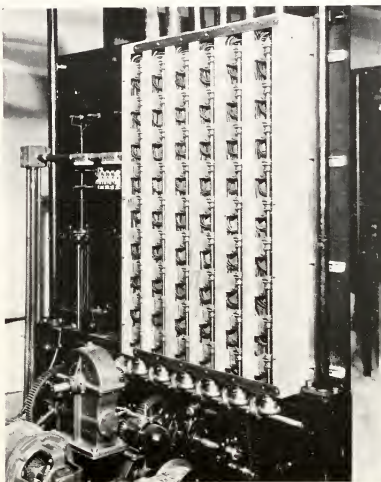
Progressive control is accomplished by means of one central impulse sending controller, which keeps the several units operating in synchronism, and several relay-actuated motor driven controllers located at the signalized intersections, each connected to the local utility mains at the nearest available point, and all connected by a control cable to the impulse sender. All units are housed and mounted as previously explained.

All of the above mentioned units are provided with optional manual control for emergency operation. The length of cycle, division of cycle, and duration of amber light, can be readily changed by a dial adjustment without interrupting the operation of the units.

The controller used for timing the 67 coordinated intersections in the central business district is of special and probably unique design. It consists essentially of 67 four contact circuit breakers mounted on a single frame and actuated by a single motive power, with 14 spare units, and complete equipment now installed for the addi-

tion of 27 units when desired, making a present capacity of 108 intersections.

The equipment includes a main control board, a transfer and terminal board, a resistance panel, a five-panel power board, and two 40 kw. motor-generator sets. The main control board supports the assembly of individual controllers, driven from the common shaft of either of two separate duplicate power units, each consisting of a 1-hp. constant-speed motor and a Reeves drive.



Rear view of the main control board.

The cycle of operation of the system, which is given by an electrically operated speed indicator mounted on the face of the control board, may be varied by means of a hand-control of the Reeves drive, mounted on the same board. The cycle division and amber duration for any intersection may be varied by a dial adjustment on the face of the board without interrupting operation of the intersection. The individual controllers can also be easily replaced without stopping the balance of the units.

Just back of the main control board is the transfer and terminal board, supporting the terminals of all circuits and the three fuses for the circuit to each intersection; and so equipped that any circuit may be transferred to one of the spare control units without interrupting the system. Busbars on the terminal board supply energy to the signal circuits. Back of the terminal

board is the panel supporting the three lamp-voltage regulating resistance units for each intersection.

Either of the duplicate motor-generator sets is used to reduce the available 220 volts d.-c. to the desired 150 volts d.-c.; this voltage is also available in case of failure of the usual supply by virtue of a 150-volt tap on the large City Hall 220-volt storage battery.

These motor-generator sets are built to provide voltages between 120 and 180 volts so that intersections at a greater distance from the City Hall than those now in operation may be added to the present system by merely raising the voltage applied to the whole system and inserting proper resistances in the shorter lines.

The split controller has recently been developed for the scientific handling of intersections embodying three intersecting streets with a central triangular island. It is a variation of the progressive controller, using one impulse furnishing controller, and three or more relay actuated, motor driven controllers installed at one location.

When a signal is installed at an isolated intersection, the power supply, 115 volts a.-c. or d.-c., is brought from the nearest utility main to the controller at the intersection in a two-conductor No. 10, 250-volt, rubber-covered, lead-covered cable, either in present utility or city ducts, or in specially laid 2 in. fiber conduit concrete encased. The

signals are connected in multiple to the controller by means of six-conductor, No. 10, 250-volt, rubber-covered, lead-covered cable, installed either in existing vacant ducts, or, where none exists, in 2 in. or larger iron pipe laterals pushed under the street pavement and car tracks. Spliced joints are avoided wherever possible by terminating incoming and outgoing cables at the aforementioned signal terminal block. Handholes are not ordinarily needed, as two or three laterals may be brought up within a single signal base. The entire visible installation is painted a signal green. Figure 1 represents the wiring diagram of a typical two-way intersection.

Except for the wiring scheme, elaboration of control mechanism, and number of signals involved (12), a split signal installation is identical with an isolated two-way or three-way

installation.

Where a remotely controlled signal is installed the remote and standard controllers are connected with the standard six-conductor cable, the balance of the installation being the same as at an isolated installation.

In the case where several intersections are to be controlled progressively from one synchronizing timer, the installation at each of the several individual intersections is identical with that at an isolated location except for the relay in the controller; in addition the several relay actuated controllers are connected to the timing unit by means of a three-conductor, No. 14, 250 volt, rubber covered, lead covered cable installed in conduit.

Prior to the installation of the Loop system, an elaborate scheme of coordinated timing, described more fully subsequently, was determined.

Although this scheme lent itself readily to the generally suggested plan of having one master impulse cable of 20 or more conductors throughout the Loop, with a relay actuated controller tied into the utility mains at each intersection, it was decided to secure the maximum flexibility of operation and the minimum of non-centralized trouble, by bringing the signal-lamp operating current direct from the City Hall to each intersection with out the interposition of any relays or auxiliary feeds whatever.

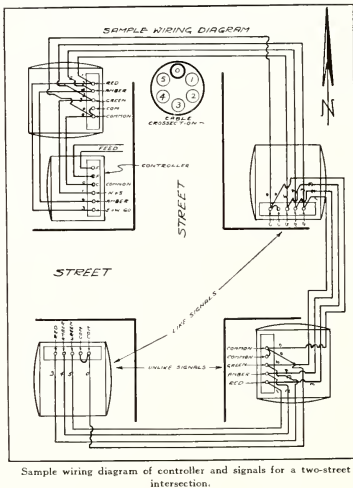
After consideration of the economy factors involved, a No. 10 conductor was decided upon. To compensate for the heavy line drop, which for the farthest intersection then under consideration is 35 volts, a voltage of 150 volts is applied to the system, with proper resistor units in the shorter lines.

This then involves the installation of five independent conductors from each intersection to the City Hall; two for the two portions of the cycle, with one for a common return; one for the amber feed, and one for the amber return. These are carried in 6, 10, 15, 20, 25, 30, 35, and 40-conductor, 250-volt, No. 10, rubber covered, lead covered, cables, placed in Commonwealth Edison Company or City of Chicago conduit.

The installation at each intersection is identical with that at an isolated location, with the exception that the four units are connected in multiple to the control feed from the City Hall instead of to an individual controller, and that there is one instead of two spare conductors in the six-conductor

distribution cable. Optional manual control is not deemed necessary nor provided for.

Based on a 7:30 a. m. to 12:30 midnight schedule for the 268 units in the Loop district, their power consumption is approximately 230,000 kw.-hours per year. Based on twenty-four hour operation of the 909 outlying units their power consumption is about 982,000 kw.-hours per year. This makes a total power consumption for the system of 1,212,000 kw.-hours per year.



There are now in service 67 signalized intersections connected to the central control board, and 208 outlying installations, or a total of 275 installations embodying 1177 signals, 268 of which are in the Loop district and 909 outlying. The outlying intersections are divided as follows:

Intersections	Signal units	Type
1	12	Split-Progressive.
152	608	Two-way Isolated.
27	176	Three-way Isolated.
8	33	Broadway Progressive System.
4	16	Western Ave. Progressive System.
16	64	Remote Controlled.
208	909	Total

The two-way controllers provide a cycle of operation varying from 25 to 125 seconds and permit the division of the cycle at any point between 25

and 75 per cent. The most common cycle now in use is 50 seconds, with the most unbalanced split of 40-15 seconds. At such intersections as those on Broadway north of Lawrence Ave., where the split is 35-20 seconds, practically the only necessity for the signal is to break up the rapidly moving traffic sufficiently to allow the pedestrian an opportunity to cross the street.

The common practice of regulating the intersection of three streets by means of a two-way controller, merging the time of the least used street with that of the one adjacent to it, was not considered conducive to safety and expedition of traffic; and so in all such instances the three-way controllers were used. These provide a cycle varying from 30 to 100 seconds, and a division thereof ranging from 15 up to 50 seconds as the maximum for any one street. In this case, each of the three streets receives its proportionate individual share of the total cycle. The most commonly used cycle is 60 seconds.

The duration of the amber light is adjustable from zero to seven seconds, the present usage being a three second amber signal before each change, showing with both the red and green signals.

A three-way intersection with a central island can be handled in any of several methods with varying degrees of success. The busiest street may be signalized at both intersections, both signals being operated from a single controller, leaving the third intersection to its own operation without a signal. This results in some confusion where, as is usually the case, all three streets are quite busy.

All three intersections may be signalized, and operated from a three-way controller, giving each street its proportionate share of the cycle. This results in one intersection being idle at all times, increasing congestion and delay.

The split system of timing recently installed for this type of intersection is essentially a progressive system with some of the signals split in such a way as to give the maximum use of the three intersections.

The remote control is used where two intersections on a single street are close enough together to be operated on the same timing.

The progressive system such as used on Broadway from Montrose Avenue to Devon Avenue, a distance of two

(Continued on page 138)

A CONTINUOUS TWO SPEED SYSTEM of AUTOMATIC TRAIN CONTROL

By H. E. LARSON, '28

Student in the Department of Electrical Engineering

AUTOMATIC control of railroad trains is not a new idea by any means, yet few people realize that transportation safety standards are being constantly raised as automatic train control systems approach universal application. There are fewer people having concrete conceptions of how such a system works and what it entails in the way of equipment.

Universal application seems assured from the precedent established by the Interstate Commerce Commission requiring certain railroads to install some form of automatic train control system.

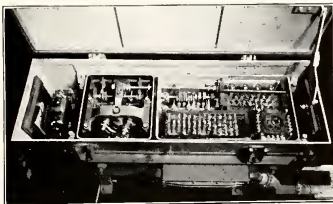
Several of these systems have been developed, all of them differing in technical principles and details, in the accomplishment of similar results. A typical one is that installed on the Chicago and North Western Railroad between Chicago and Council Bluffs, Iowa. It is known as the Continuous Inductive Two Speed System and is manufactured by the General Railway Signal Company of Rochester, New York. In what follows, its operation and some of its essential equipment will be described.

The object of this system is to enforce safe, maximum, tapered, and low speed limits according to traffic and track conditions, by first warning the engineer that he must act, then, upon his failure to do so, to assume decelerating control of the train.

This system limits the speed of passenger trains operating in a clear or *proceed* block of track to 70 miles per hour, and to 20 miles per hour in a *caution* zone. Any increase in speed beyond these limits will cause an application of the brakes which remains in effect until released by the engineer. The engineer cannot effect a release until the speed is less than 70 or 20 miles per hour as the case may be.

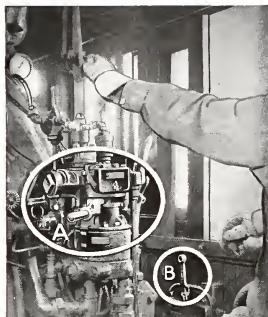
Before brakes are applied for excess speed, certain warnings are given the engineer. As the speed is increased to 67 miles per hour a low pitched horn sounds and continues sounding until the speed is reduced. Likewise, in a caution zone, the low pitched horn will sound at 17 miles per hour, and again is only quieted by a reduction in speed. If the speed continues to increase the brakes will be applied at the upper limit.

If the train is operating on a clear block of track, a small signal light in the cab shows green and the engineer's only limitation is the upper speed limit of 70 miles per hour. As the train passes into a caution zone, however, the green light gives way to a yellow light, a shrill, high pitched horn sounds, and if the speed exceeds 17 miles per hour the low pitched horn will also sound. The shrill horn indicates that a caution zone has been entered and the engineer must acknowledge the fact by operating the acknowledging switch, which is lo-



The mechanism in this box consists of the primary relay, dynamotor, and the amplifier; the box is mounted on top of the tender.

cated in the engine cab and is shown in one of the accompanying photographs. Closing this switch for only an instant quiets the high pitched horn. If the engineer fails to acknowledge after the train has traveled 300 feet, an automatic application of the brakes takes place which cannot be released until the train has been brought to a dead stop.



(Accompanying illustrations courtesy of C. U. N. W. R. R.)

Interior view of the cab, showing:
A—Connection on automatic brake lever.
B—Acknowledging lever.

Assuming that the speed of the train was more than 17 miles per hour, as it entered the caution zone, and that proper acknowledgment was made, the engineer then applies the brakes in the usual manner sufficiently to reduce the speed to 20 miles per hour within 3600 feet after entering the caution zone. If the rate of deceleration is less than that predetermined by the control mechanism, which is that required to bring the speed of the train from 70 to 20 miles per hour within 3600 feet after entering the zone, the brakes will be automatically applied. Such an application of the brakes may be released as soon as the speed of the train is below the tapered speed limit of the mechanism. The low pitched speed horn, which has been sounding all the while, is quieted as soon as the speed is reduced to some value below 17 miles per hour.

After the train has traveled 3600 feet into the caution zone the high pitched horn will again sound to inform the engineer that low speed restriction is in effect and he is obliged to make acknowledgment before the train has traveled 300 feet to forestall brake application. While traveling in a caution zone the high pitched horn is sounded every half mile and the engineer must acknowledge accordingly thus assuring his alertness.

When a train leaves a caution zone and passes into a clear block the signal light in the cab again shows green and a gong sounds informing the engineer that all but maximum speed restrictions have been removed and that he may resume normal speed.

The engineer is at liberty at any time to stop, back up, pass into a sid-

(Continued on page 144)

**UNDERWRITERS' LABORATORIES
INSPECTED
2 1/2 GALLON HAND FIRE EXTINGUISHER
CLASSIFICATION A-B-C-130.**

A Reproduction of the Underwriters' Laboratories' Label

THE DEVELOPMENT OF FIRE FOAM

By J. T. Even, '28

Student in the Department of Fire Protection Engineering

IN almost every large American city and in many of the smaller cities and towns, large bulk oil storage plants have been erected as tank wagon filling and oil distributing centers. The increased use of the automobile and of commercial processes requiring gasoline and other inflammable liquids brought about these stations, which have now become a necessity in the course of our modern life.

Even though the best constructed and the most modernly equipped oil plant constitutes a severe fire hazard, there is no occasion for unnecessary alarm about the rapid growth of these stations. To prevent these bulk oil storage stations from being built within or near our city limits would be impossible and absurd—almost as absurd as trying to rule the many millions of automobiles from our streets because they carry a tank of gasoline.

The most pressing need today—the demand of common sense—is for more knowledge of the character of the fire hazard and then, logically, the correct type of building construction and safeguards together with that particular kind of fire-fighting equipment that will serve most effectively, with greatest personal safety and a minimum damage.

About twelve or fifteen years ago the oil industry became alarmed at the diminishing oil supply and began to show some real interest over the huge property loss due to tank and refinery fires. Up to this time nothing was done to protect these tanks and it seems everybody expected oil tanks to burn, and that was all there was to it. With the increased use of gasoline and other inflammable products, increased storage and production resulted and consequently increased fire loss.

Then the industry decided to find out, if possible, the causes of these fires and any remedies that might be discovered as a result of this investigation. Underwriters' Laboratories and the Bureau of Mines worked jointly on this problem and found that about 98 per cent of all such fires were due to lightning. The final report indicated that improvements in house-keeping and extinguishing methods were needed.

Now foam for fire-fighting purposes had been known for a long while, although its originator is still unknown. Patent litigation has brought forth many claims of priority so it has become difficult to trace the development from its experimental stage to its present wide commercial adoption. The records are not very clear, but the credit for the first use of foam for fire-fighting purposes is given to a

German chemist, who successfully extinguished a prepared oil fire by pouring a mixture of certain chemicals down a chute, the chemicals producing a foam during their flow in the chute. The chemicals used were supposed to have been a sodium-bicarbonate solution and either sulphuric or acetic acids, with egg albumin as the foaming agent.

Many other scientists experimented with foam and then came the work of Gates and Laurent, both of whom made use of acid, and for the first time we find mention of a vegetable



Test of a 2 1/2 gallon foam-type extinguisher on a gasoline fire.

Immediately the Underwriters' Laboratories were besieged with a large group of inventors and others who desired listing of some device to eliminate the inherent fire hazards of the oil fields. Lightning arresters, tank seals, safety vents and a large variety of ideas which had varying degrees of merit were submitted for investigation. Among the first of these having real merit was a comprehensive foam system for the protection of oil refineries and tank farms.

The system comprised a complete layout, the engineering details being different for each particular risk to suit the conditions. It consisted of solution tanks with mixing chambers, pumps, valves, pipe lines, and so forth, all designed to carry out one aim—the use of foam as a fire-fighting medium.

extract as a foam producer. The next development was made by a group of engineers with a western oil company, who succeeded in extinguishing an actual (although experimental) fire in an oil tank by the use of foam produced from glue. The United States Navy Department at about this time recognized a portable extinguisher which employed glue as a stabilizing agent and which apparently gave satisfactory results. Its weakness, however, lay in the fact that the glue would not "keep" and hence the extinguisher was in an operative condition only when freshly charged. Subsequent investigation by other interested parties led to the development of the modern type foam, which is produced by the interaction of sodium bicarbonate, aluminum sul-

phate, and a foam-producing ingredient.

The engineers in chage of this investigation knew nothing about foam, nor did anybody else. They just had to go right after foam and find out what it was all about. Would it control oil fires? Would the solutions keep? What was the ratio of the two solutions to extinguish a fire of given dimensions? Would age have any effect upon the two solutions? Was it stable? How stiff should it be? Would it react with the containers? These and many other related questions show plainly that a detailed study of foam was equally as important as the testing of the system to apply it to fires.

Foam is not as simple a subject as it may appear to be. As was previously stated, it is the product formed in the reaction between aluminum sulphate and sodium bicarbonate, the latter substance containing the foam-producing ingredient. In the reaction carbon dioxide is formed. It is true that it is formed in the soda-acid reaction, but it escapes into the air at the time of discharge and does little or no practical good, whereas in the foam extinguisher the stabilizer acts to retain the carbon dioxide in minute bubbles, the whole mass forming a plastic heap of tenacious foam. The "stiffness" or "wetness" of foam depends upon the kind and concentration of the foaming ingredient. In the case of fire foam it is likely that the familiar gelatinous behavior of aluminum compounds in solution adds somewhat to the tenacity of the resulting foam. The actual fundamental principle of foam is complicated and not thoroughly understood, being an example of the phenomenon which the physical chemist designates as "adsorption," for foam of this character is apparently a colloid.

The mere fact, however, that absolute scientific knowledge of it is not yet known does not prevent its commercial adaptation and use. There is nothing mysterious about the stabilizer used. Any substance which contains an invert sugar will produce foam, but will it produce a foam which will be of proper consistency and have a sufficient lasting quality? Then again it must be remembered that these vegetable materials are attacked by bacteria—yeasts and molds—and that in time they may become useless due to fermentation. The primary purpose of a foam extinguisher is to put out

a fire, so in addition to these chemical and physical properties, the foam must have the proper concentration and give adequate performance on the various types of fires.

The major part of the testing of any new foam device consists in determining its action on the class of fires for which it was designated. Foam devices are listed for use on Class "A" and Class "B" fires. Underwriters' Laboratories have defined these fires as follows:

"Class A fires are defined as incipient fires on which the quenching and cooling effect of quantities of water is of first importance, i. e.,



(Courtesy of American-LaFrance & Foamite Corp.)

Comparative effect of water and foam on a tank of burning liquid.

fires in ordinary combustible materials, such as wood, paper, textiles, rubbish, etc.

"Class B fires are defined as incipient fires on which the blanketing or smothering effect of the extinguishing agent is of first importance, i. e., fires in small quantities of rapidly burning material, such as gasoline, oils or greases in vats or other open vessels or on floors."

Just how does a foam extinguisher control these two classes of fires? There seems to be a wide variety of opinion on this point, so far as the Class A fire is concerned. One group are of the opinion that the action of foam on Class A fires is essentially the same as that of water, the action being one of quenching and cooling and consequently foam should approach water as closely as possible but still retain enough body and stiffness to enable it to form a tenacious blanket on Class B fires—waxes, oils, etc. The other group maintain that foam has nothing in common with water; that its action on Class A fires is one of blanketing and smothering and that therefore it should be dry and adhere to the surface to which it is applied, but that it should be mobile enough to flow over burning oils, etc., when ap-

plied to Class B fires. Approved devices using both kinds, the wet or "sloppy" and the dry foam, have been in use for quite a while; both control either type of fires; excellent service records are held by both and each has its enthusiastic supporters among the users.

There are, of course, other foam devices beside the large individual system which was first submitted for test. You have all seen the familiar 2½-gallon portable extinguisher, and the 40-gallon engine mounted on wheels and used for general factory and warehouse protection. The basic principle of all these devices is the same, but

in the design it is not a problem of multiplying one by 15 or 20 to get the size of the other, there are other factors to consider. There is another type of apparatus known as the stationary foam generator, which is used to protect inflammable liquids with the surface exposed. This type of extinguisher is suspended directly over the fire hazard. A fire causes a rapid and sudden rise of temperature which sets off the sensitive automatic releasing mechanism, resulting in the mixing of the two chemical solutions; the foam thus generated falls

upon the burning liquid and smothers the inflammable liquid fires before they can spread.

One of the recent types of foam devices to appear on the market is the portable foam generator. This device produces a sustained stream of fire-smothering foam by introducing a dry chemical powder into a flowing stream of water. The chemical, passing through the hopper, mixes with water and forms the desired foam. The rate of flow of water through the generator automatically controls the drawing into the stream of the right amount of powder. Should the flow fluctuate, the flow of powder will fluctuate proportionately. This type of extinguisher has many advantages: It eliminates the expense and bulk of premixed solutions necessary to other forms of chemical fire-fighting equipment. It may be used wherever a hose line is available. Its effectiveness is not limited to the capacity of the two solution tanks, since it may be operated as long as a supply of dry powder remains, and naturally it does not have to be cleaned and recharged yearly as in the case of stationary types of foam generators. It is finding its greatest application in municipal fire department work since it is so easily mounted on

the running board of a pumping engine and can so easily be transformed into a foam engine when that method of attack is needed.

It is well to conclude any consideration of the foam type of extinguishers with a thorough understanding that it is designed for a specific purpose. It is not adapted to all conditions and is not made to supplant other types of fire-extinguishing devices. It is dependable and its introduction on a large commercial scale has done much to reduce the fire loss in oil fires and to aid fire prevention. There are many cases in which the soda-acid extinguisher is superior to foam; there are also many cases where the use of foam instead of carbon tetrachloride may be a serious mistake. The hand pump filled with calcium chloride, or any of the other non-freeze extinguishers may be better adapted to a given situation than the best foam extinguisher that ever will be made. Yes, the lowly pail of sand, under some conditions may even be preferable to any type of extinguisher. It becomes obvious that different risks require different types of fire-extinguishing apparatus and to expect one extinguisher to put out all types of fires is just as foolhardy as to expect one medicine to cure all diseases. If you have ever noticed the label on an approved extinguisher, you probably saw the classification "A-1" or "B-1," and wondered what it meant. This establishes, first, the sort of fires on which the device is effective, and second the number of devices to be used in one unit of fire protection.

As a conclusion, it must be remembered that all these devices are primarily first-aid devices; that they should not supplant the fire brigade, the municipal fire department, or even the sprinkler system—they are designed to put out the incipient fire, before it gets a chance to be a big one.

Theoretically, at least, every big fire was once a small one; so to combat against the incipient fire a complete equipment of first-aid fire appliances should be installed, not only of the type considered here, but of any or all types, depending upon the risk involved.

PERSIAN PROVERBS

He who *knows not* and *knows not* that he *knows not*, he is a *fool*.—shun him;

He who *knows not* and *knows* that he *knows not*, he is *ignorant*.—teach him;

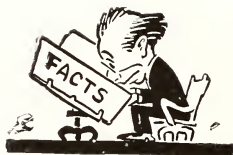
He who *knows* and *knows not* that he *knows*, he is *asleep*.—wake him;

But he who *knows* and *knows* that he *knows*, he is *wise*.—follow him.

FRICITION LOSS IN SILK HOSE

By N. S. Ewing, '29

IT is advised from an unofficial source that the current editions of all reputable text books on hydraulics will undergo serious revision as the result of some startling experiments performed by a group of undergraduates at Armour Institute of Technology. It was found after con-



siderable research that the friction loss in hose lines varies widely with the material used. Rough and smooth lined cotton and unlined linen hose have been used, but it is especially amazing the possibilities that are revealed by the use of silk. Temperature, too, was found to exert considerably greater effect than was previously thought to be the case.

These discoveries will not change that honorable relation

$$h'' = \frac{fL}{d} \frac{v^2}{2g}$$

but will result in a modification of the existing tables of friction factors. Heretofore, 0.02 was usual, but the Armour studies often found it preferable to use double-O, two.

In explaining the phenomena observed while conducting the research work on the effects of temperature, it was deduced that expansive tendencies and the variation of the coefficient of viscosity would afford satisfactory explanation. The graph of the data indicated that the hotter the contents of the hose, the greater the loss attendant. In fact, with the right head above the hose and at a certain critical temperature, there is sometimes experienced a complete loss of head. This latter loss, as would be expected from the formula, varies markedly with the

speed. Despite this, the gravity of the situation is unchanged.

The most recent work of this committee in its study of friction loss in silk hose has been an investigation of seamed and seamless varieties. For rough work, the former have proven satisfactory, but for high-pressure service the latter stand unsurpassed.

We have come now to a consideration of those other factors, the length and diameter. The equation shows that the friction loss varies as L over d . The epochal experiments made on and off the campus refute, or rather, modify it for it was agreed that from esthetic considerations alone certain limits must be imposed on the empirical relation given. Observations have shown that for both extremes of diameter there is entailed a total loss.

The absolute value of the length L is relatively unimportant; it is the proportion of length and diameter that is of concern. If the ratio of diameter to length results in a rather unwieldy product, the undesirable effect may sometimes be balanced by the introduction of reducer loss. A drop of only a few pounds will work wonders.

To certify their results, these pioneers of science made repeated trials, but the length of run had too great an effect. Seeking for a method of stabilizing this erratic behavior, the experimenters consulted with a select committee of professors from the electrical department. Confronted with the problem, the latter hesitated not, and quickly responded:

"Different conditions exist, of course, in lines where the hose is filled and in lines which run only partly full. These conditions are best presented by suitable curves, the conventional saturation curve representing the first case. Here we see that the point of the curve on which we operate determines the stability of performance. In general, maximum sensitivity is obtained when operating below the knee of the curve but the advantage of greater stability obtained when working above this region is off-set by an increase in reluctance. This latter objection may be overcome by proper designing."

Their answer was accepted as a satisfactory solution.

TELEPHONE CABLE MANUFACTURE

By Robert E. Vining

Public Relations Branch, Western Electric Company

LET us journey to Japan to start this story. Visualize—for the sake of the analogy we would draw—one thousand silk worms at work producing the product for which the "Land of the Cherry Blossoms" is famous. The cocoon is spun, and the fibre finds its way over the world in all forms of merchandise—an essential article to millions.

We return to Chicago and visit the Western Electric Company's Hawthorne Works, on the southwest side, known as the "World's Telephone Workshop." At this huge institution, functioning as the manufacturing and supply unit of the American Telephone and Telegraph Company, one thousand persons are engaged in producing the major portion of the world's supply of telephone cable.

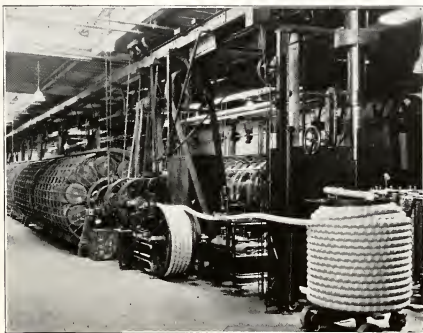
Like the silk worms of Japan, the cable craftsmen of the Western Electric Company are engaged in fashioning a fabric, the skein of which, unlike that of silk, which symbolizes beauty, typifies instead progress and utility. And while the one is dependent upon the other, our discourse will deal with the sturdier strands of cable that link the country with the city, towns with teeming metropolises and continents with one another.

Now to the technical—that of interest to technicians.

A construction project involving the expenditure of almost two and a half million dollars is now nearly completed at Hawthorne. This program, work on which got under way in November, 1926, was necessary in order to meet the record-breaking toll cable schedules authorized by the American Telephone and Telegraph Company.

The plans included sweeping alterations to the cable manufacturing facilities at the local Western Electric plant, assuring an increase of approximately seventy per cent to the former toll cable capacity, or an output of 85 million conductor feet of toll cable per week with operations on a daylight schedule.

Included in the project were the remodeling and reconstructing of sixteen buildings, having a total floor space of about 350,000 square feet, the shifting and moving about into new locations of all the existing plumbing, heating, lighting, gas, and air service lines; the rebuilding of steel work; the relocating of brick walls; new roofs; new windows—and in fact, new work throughout.



The lead-covered cable stranding machine shown here spirals the pairs or "quads" into a rope-like cable core, and winds two layers of heavy paper around it.

The major undertaking affected the so-called central group of cable buildings at Hawthorne. The walls separating these have been ripped out to form a single room 300 feet wide by 500 feet long.

The foregoing presents a picture of the structural devices necessary to carry on the important work of cable manufacture. It is interesting in this connection to point out the fact that during the progress of construction the output schedules were maintained and that during 1927, Hawthorne produced 21,007,074,000 conductor feet of lead covered cable. This means that one reel of cable is dispatched from Hawthorne by freight every three minutes.

It might be well at this time to trace briefly the various stages in cable manufacture before the finished product is ready to be coiled up in the familiar reels so often seen along the nation's highways, just to show that there is more to cable-making than merely

pressing the button that starts a world of machinery.

Consider first the task of keeping the necessary raw materials on hand to feed into these batteries of hungry machines. It takes many million pounds of paper, lead, and copper to keep the cable plant's present machinery active during the year. A large proportion of the lead supply of the world is used annually at Hawthorne.

It requires many miles of railroad cars to haul just this one item to the plant. Millions of pounds of copper and paper are other cable requirements—to say nothing of the cotton, silk, antimony, and tin used.

From a floor-space standpoint alone, it is impossible to keep such vast stores of material on hand. In fact the interest for one year on the money expended on just two items, paper and copper, amounts to hundreds of thousands of dollars, which in itself is a potent reason for not tying up funds for any longer than is absolutely necessary.

The first job, then, in cable manufacturing is to maintain just the right stocks of raw materials—enough to meet any emergency which might arise, but not enough to tax floor space or to tie up an excess of capital. And it is quite some job to outguess tie-ups and determine just the right safety factor to permit of a supplier falling down on a promise now and then without tying up the process of productive schedules.

The raw material on hand, next comes the job of scheduling orders on the shop and following them through as the manufacturing processes on the cable proceed. First, the bare copper wire must be covered with paper. This is done by insulating machines, which wrap the paper covering around the wire in a continuous spiral, overlapping at the edges in about the same way as the tape we used to wrap around our baseball bats when we were youngsters.

After the insulation is applied, the single strands of wire are twisted to-

gether, usually in pairs, but sometimes in *quads* or groups of four. Next, they pass to the stranding machine, which spirals them into a sort of huge rope, known as a cable core, which as it leaves the strander is wrapped with two layers of heavy paper and then wound on a core truck.

It is then placed in a baking oven, where all moisture is driven off, after which it is ready for its coating of lead, to be applied by a hydraulic press. This, in brief, is the manufacturing process, but the cable must also undergo a host of inspections along the route, the enumerations of which exceed the space limits of this article.

To protect lead-covered telephone cable from damage, especially in shipment, to facilitate economical storage, and to provide for easy handling, it was necessary to develop a specialized type of reel. This forms a cable container almost ideal for its purpose.

Winding cable about the drum allows a considerable number of feet to be packed in each unit, without in any way damaging the conductors. The great weight of an average length of cable might easily burst any ordinary type of container if it received a severe jar, but a reel stout enough to withstand such shocks can be made economically.

From a storage standpoint the reel allows the maximum amount of cable to be packed into any given space and at the same time lends to easy handling by rolling when transference is necessary, as when a shipment of cable is to be loaded or unloaded. The reel is also equally convenient in cable-laying. The men installing lines would be up against a hard job without their cable on reels. As it is they can take a truck load of them out along the route and unload them easily where required. When they start laying the cable it is only necessary to jack up the reel and unwind the length as they need it.

Considering the amount of cable installed every year, it is easy to see why reel-making has become a specialized job at Hawthorne—a job requiring its own methods and machinery. The enormity of the cable plant has itself been enough to cause a study of manufacturing requirements, so that there may always be a supply sufficient for proper service to the plant and the various units of the Bell Telephone System.

Moreover, careful design and workmanship are necessary so that the reels may be able to weather all sorts of rough usage. What this has accomplished in the way of manufacturing methods can be seen by the following description:

The demand for a sturdy cable reel has resulted, necessarily, in careful attention to the structure and manufacture, while supply requirements have meant a well-developed system in the handling of the materials and unit parts that go into the finished product.

The raw material for the reel heads is one-inch soft wood. Thicker wood (1 3/4 in.) is used for the drum lags,

as a pivot. This pin can be shifted back and forth on the arm to accommodate heads of different diameters. One operator turns the head against the saw while the other clears away the scrap lumber as it is trimmed off.

Boring the holes for the center bearing, the connecting bolts and the cable end, is the next operation. One big drill and two smaller drills, mounted above a low, broad table are used for this work. The operator first lays the reel head on the table and nails on the drum head, a smaller wooden disc, to which the cross-pieces are later nailed to form the drum of the reel.

He locates this centrally by means of one of the circles previously marked by the nailers. He then bores the center hole, following with the slot for the cable end and finishing with the bolt holes. Aside from a little chisel work on the cable slot, the head is ready for assembly after these holes are bored.

Each head is now lettered with black paint through steel stencils, following which the casting that forms the center bearing is inserted into the large hole and bolted fast. Two heads are then rolled over to a pair of assembly rollers, where one operator steadies them in a vertical position until the other has slipped the bolts through the

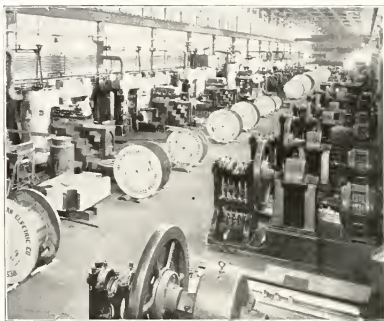
holes.

These bolts hold the heads upright while four inside braces are nailed fast and the lags that form the drum are nailed to the rim of the drum head. These lags are especially cut to fit the curve of the drum head. Later, in the cable plant, outside lags are nailed on the reel heads after the cable is wound on, to protect it from damage.

Repair work is an important part of the shop's activities, about 60 per cent of the reels turned out being repaired ones. This work has two phases. One is straight repairing, where bolts are replaced, new lags nailed on, drum heads strengthened with nails, and so on. Another type of repair is called *cut-down*. In this case sound heads with badly worn rims are sawed to a smaller diameter and then assembled again.

These small reels are useful when an order for a short length of cable is received, as they obviate the necessity of making a special reel for such orders, or using a regulation size reel much larger than the cable requires.

(Continued on page 146)



The lead press room, showing the hydraulic presses in the rear.

while the outside lags, for nailing across the heads after the cable is wound onto the drum, are made of 2 1/4 in. lumber.

The first stop of the lumber in its journey through the shop is made at the planer, where it is planed to an even thickness. It is then piled on trucks and trundled to a crosscut saw, where an operator cuts the boards to varying lengths. This saw can handle five boards at a time, piled one on top of the other. It will cut enough lumber in a day for 75 reels.

Trucks are used again to carry the sawed material to the third machine, which *joins* the lumber, that is, makes the edges absolutely straight, so that the boards, when assembled together, will make a tight-fitted reel head. As the working or finishing of the raw material is completed with this last operation, the material is now piled so that the reel-head nailing machines can do their work.

From the nailing table the heads move to a band saw, where they are trimmed to a perfect circle. The head is laid on the table and held firm by a pin at the center, which also serves

An UNOFFICIAL COMMENCEMENT ADDRESS

By James C. Peebles, '04

YOUNG Gentlemen of the Graduating Class: Like a hen with a strictly fresh egg, or a young father with a brand-new son, you are filled at this time with a sense of accomplishment. And if like the pullet and the papa, proud of their biological virtuosity and telling it to the world, you are inclined to be a bit vocal about your achievements, I have no criticism for you. In my mood just now there is more of blessing than of ban.

Throughout the past few weeks I have rejoiced with you and with the thousands like you throughout the land. Today I rejoice with you and present my congratulations and commiserations. "But why your commiserations?" you may ask. "We are almost college graduates; our curve of knowledge is now approaching its peak from which it can go no way but down, and we as students have reached the apotheosis of your career. Your commiserations seem sadly out of harmony, like a professor who gives an examination at the end of the senior year, or a nascent alumnus who talks about a job instead of a situation."

In view of this quite natural reaction on your part, allow me to explain. As your zero hour approaches and you advance to meet the world, all the artillery of admonition will lay about you a veritable barrage of *do's* and *don'ts*.



From sermons and addresses and farewell lectures good advice will be cast with lavish hands upon the stony soil of your preoccupation. For the present address there is this extenuation; you are not required to read it; for the others I can only comment you to the mellow mercies of Morpheus. Now do not misunderstand me. There will be no lack of merit in the advice which will be offered you; most of it will be sound and grounded firmly in worldly wisdom and genuine concern for your welfare. But you, through no fault of your own, are in no condition to receive it.

At this time each year it is impressed upon me that graduation is more an attitude and a frame of mind than a black gown and a diploma;

more an intellectual and emotional experience than an objective event. A long period of training and preparation is finished and the big race about to begin. You are set to go. Life for you is cast just now in a bravura passage, and it calls for pep and punch



and high endeavor. No wonder then that we, your advisors and well-wishers, are seen through far-away eyes and our admonitions fall upon heedless ears. And if our sublimated wisdom becomes for you a mere abracadabra the fault is neither yours nor ours; this is a time for action not for conjuring.

This commencement address, therefore, will depart somewhat from conventional lines, and present a thought or two which are often left unsaid. I remember well the typical address of a generation ago, with its attempt to write out a formula for success. With an air of infallibility appropriate to a professor of mathematics and perhaps to a very few others, the speaker set forth and defined the factors in his formula. Let me mention just a few of them: "Start at the bottom; and work up; master your job thoroughly; learn something about the job just ahead of you; earn a bit more than you get; work hard and save your money."

These and others similar to them are what I call the rational factors in the formula for success. After four years at A. I. T. where hard work is accepted as a matter of course, you should be able to evaluate these factors with considerable success. You have received a sound training in the fundamentals of your profession, you are not afraid of work, and you have

a sane, feet-on-the-ground attitude towards your place in the world. We are banking on you to solve that rational formula.

But few problems in engineering and still fewer in life can be solved on a purely rational basis. You have learned that many of your formulas contain empirical terms, experience factors, which sometimes modify tremendously your rational result. Now there are empirical factors in your formula for success: a few of them can be set down as they come to mind, as follows: opportunity; personality; friends; luck.

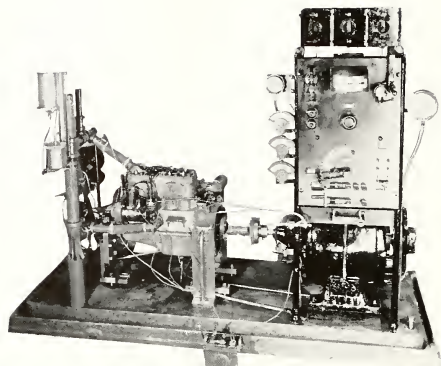
Consider the last one for just a moment. In my own undergraduate days any commencement orator, beautiful in broadcloth and beatitude, would have raised hurt hands to high heaven at any such suggestion. But let us see if it is not a perfectly proper factor in the formula which we are trying to write. Many of you have taken part in athletic contests of one kind or another, and you have all witnessed them; you all know what we mean by the "breaks" of the game. We mean the fumbled ball which some alert end or half-back snatches up and carries for a touch-down in the last minute of play. We mean the little dinky hit down the foul line which goes fair by an inch while a runner scores from third and a well-pitched game is lost. We mean the billiard game where many a good man has been ruined by a kiss.

In the all-absorbing game which you are entering just now you should give some attention to the breaks. You have heard it said, perhaps, that a champion always gets the breaks, but like many other generalities this is true only part of the time. When they go against him the champion neutralizes their effect by keeping his head, increasing his efforts,



and bringing to bear upon the situation all the nerve and skill which made him a champion. When the breaks are with him he takes advantage of them to the full and the result is victory. Obviously we cannot all be champions but we can learn from

(Continued on page 146)



Test set consisting of a Waukesha four cylinder type Z engine and a Sprague block test dynamometer.

AUDIBILITY SPARK-ADVANCE ANTI-KNOCK TESTS

By Daniel Roesch, '04
Associate Professor of Experimental Engineering

SOME of the engine or fuel characteristics which are determined before conducting routine audibility spark-advance anti-knock tests in the Automotive Laboratory of Armour Institute of Technology may also be of general interest. These data permit checking the specific engine conditions and determining the magnitude of such modifying factors as mixture ratio, fuel flow while operating with various fuels at a fixed carburetor adjustment and the effects of the more or less generally accepted anti-knock agent, benzol. These factors are shown quantitatively in these notes since their importance must be evaluated. They may be termed standardization tests. The use of a reference base chart is illustrated using Penn straight run gasoline with increasing percentages of benzol. The position of an unknown fuel on this chart determines its anti-knock benzol equivalent by this method of test.

MIXTURE RATIO

The ratio of air to fuel should be known for practically every internal combustion engine test. While it is not always expedient to determine the actual air flow, the relative ratio of air to gasoline can be conveniently obtained by varying the fuel flow at a fixed speed and throttle opening and assuming the air flow constant. (It has been found that there is a slight varia-

tion in air flow with spark advance. This is attributed to the change in temperature of the residual gases in the cylinder. This influences the temperature at the end of the inlet stroke and hence may cause some slight change in volumetric efficiency.) This method is used for determining an operating-standard mixture-ratio for audibility spark-advance anti-knock fuel tests. A typical graph of the fuel flow in Lbs. per Hour vs. B.H.P. is first established as shown in Fig. 1. The standard mixture-ratio selected for anti-knock tests is indicated by the arrow and corresponds to the leanest mixture which will give maximum power. This selection was made on the assumption that most cars were operating at this standard ratio. (Many cars are, however, operated at richer mixtures than the standard in order to avoid inconvenience during the warming-up period. This means that carburetors so adjusted are too rich

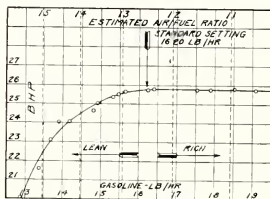


Fig. 1.

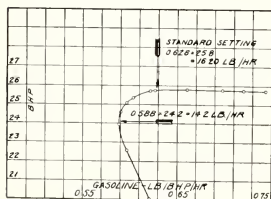


Fig. 2.

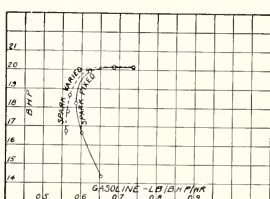


Fig. 3.

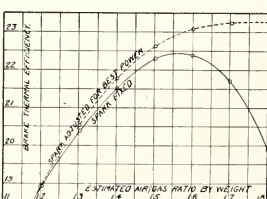


Fig. 3a.

during normal operation.) The mixture-ratio at the point selected as standard has been experimentally determined for various types of engines by many investigators. A general value for automotive type engines of moderate compression may be taken as 12.5 to 1 ratio of weight of air to gasoline. Based on this value the various mixture-ratios of the fuel flows in Fig. 1 have been indicated and similar values are later used in showing anti-knock values at various mixture ratios. (See Fig. 5.)

Fig. 2 shows a replot of Fig. 1 in terms of Fuel in Lbs. per B.H.P. per Hour vs. B.H.P. This curve shows the point of highest thermal efficiency as indicated. It should be noted that the above data has been taken with a fixed spark. When the spark is advanced for best power at each mixture-ratio, a higher maximum thermal efficiency is obtained. This latter characteristic for an engine of lower compression is graphically shown in the dotted curves of Fig. 3 and 3A.

VARIATION OF FUEL FLOW OF BENZOL BLENDS

Fig. 4 shows the variations in fuel flow of a gasoline when used with increasing percentages of commercial benzol. The carburetor adjustments were fixed for all tests and the engine operated at wide open throttle and constant speed. This is a carburetor metering inspection made with constant engine conditions except the change in fuel. The object is to obtain the carburetor metering characteristics while using various fuels since the latter may give various mixture-ratios when used at a fixed carburetor adjustment.

EFFECT OF MIXTURE RATIO ON KNOCK INDEX

It is considered essential when standardizing a new engine for anti-knock tests to determine what effect variations in mixture-ratio have on the anti-knock index. The variations of mixture ratio of a fuel can be directly evaluated in terms of the anti-knock value of a fuel by using a graph showing the mixture-ratio vs. the anti-knock index. Fig. 5 shows a series of runs made to show this variation in anti-knock indices of mixtures approximately 10 to 1 to 20 to 1 by weight. These graphs have the same general characteristics when using other engines or fuels and follow the general characteristics of similar data reported by Ricardo and others.

The standard mixture ratio selected for routine testing is indicated by an arrow. A considerable variation in this mixture-ratio shows little effect upon the anti-knock index and shows (a) the expected limitations of the

test method upon the variation of fuel flow of the carburetor when using different fuels, (b) the limitations of the test method upon the variation of fuel flow of the carburetor when using different fuels and (c) the limitations to be expected from variations of mixture between cylinders (distribution effects) when these tests are made

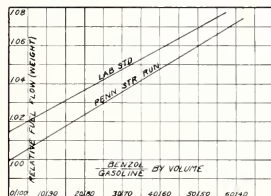


Fig. 4.

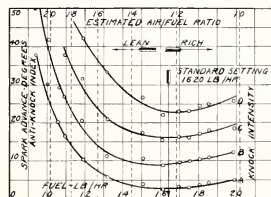


Fig. 5.

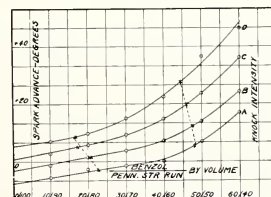


Fig. 6.

with a multiple cylinder engine. The decrease in knocking tendency for both the lean and rich mixtures is believed to be due to the air acting as an anti-knock agent on the lean side and the fuel as the anti-knock agent on the rich side.

The use of Fig. 5 as an index to the variation in effective mixture-ratio of various cylinders by observing the knock intensity of various cylinders with a fixed spark advance (anti-knock index) has been very interesting and instructive. It is believed that under the adverse conditions of cold starting the effective mixture-ratio in different cylinders of a multiple cylinder engine may vary as much as from 20 to 1 to 10 to 1. The variation de-

creases with increase of the temperature of the air intake to carburetor with increase of combustion chamber temperatures and with fuels of greater volatility. During the warming up period the effective mixture-ratio approaches and should finally equal the actual mixture-ratio as supplied by the carburetor. In other words the mixture supplied by the carburetor is effectively mingled with the air to form a homogenous and useable mixture in the cylinder. It is well understood in theory and practice that during very cold starting the actual mixture ratio must be many times normal in order to obtain an effective mixture-ratio within the range of explosiveness. The air intake to the carburetor during the tests reported was maintained at 160 deg. F. which is the general standard for this laboratory.

DETERMINING THE BENZOL EQUIVALENT

The benzol equivalent of an unknown fuel may be determined by the spark advance method of testing as indicated in Figure 6 which represents a Reference Base Chart for Pennsylvania Straight Run Gasoline and various percentages of a benzol. The observed data from the unknown fuel is plotted as indicated. This represents a commercial anti-knock premium fuel. Its benzol equivalent when using the selected Penn Straight Run as a base averages 47 per cent. When using Laboratory Standard fuel as a base the average benzol equivalent is 19 per cent. This represents a commercial non-premium fuel. The need for two standard fuels of similar physical and chemical characteristics but with widely different anti-knock characteristics as proposed by Dr. Graham Edgar becomes apparent in the interests of interchangeable standards.

The practice at the Armour Institute of Technology has been to test at four knock intensities A, B, C, and D since it was believed that possibly a fuel might rate differently when tested at an incipient knock or a heavy knock. The use of four intensities also gives a check on the data since the four experimentally determined indices are usually plotted and the faired values used. The dotted line shown in Fig. 6 represents the Lab. Std. fuel data plotted on the Penn Straight Run/Benzol reference chart. The line indicates a variation from 16 to 22 per cent benzol equivalent with a decreasing knock intensity. The variation is believed to be caused partly by the fuel characteristics and partly by the particular test methods used. Other fuels have shown essentially the

(Continued on page 156)

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Our Slogan: Make The Armour Engineer the best technical college publication in the country

*A generation ago there were a thousand
men to every opportunity, while today there
are a thousand opportunities for every man*
—Henry Ford

THIS issue marks the passing of another successful year for the ARMOUR ENGINEER. We of the new staff take this opportunity to say farewell to the Seniors of the ENGINEER staff who now leave us. It has been a pleasure to serve under them, and to watch the successful outcome of their undertakings. May we be able in some small measure to duplicate their results.

This year has seen the continued progress of our campus life. The most outstanding event, perhaps, has been the establishment of a bi-weekly newspaper, the *Armour Tech News*. Its continuance next year as a weekly is now assured. We believe that the *News* will play a bigger part on our campus next year, and that it will grow to a size in proportion to that of our college.

Next year will mark the twentieth anniversary of the ARMOUR ENGINEER. In looking back over our files we note the continual evolution that has taken place. That this will

continue we have no doubt. We expect the *News* to relieve us of the greater part of the burden of carrying local news; it is our plan to publish only the outstanding events, those worthy of a more permanent record, and still to avoid duplication with the *News* as much as possible. In this issue, which was handled almost exclusively by the junior staff, we have wrought this change in two of our departments. The change will be for the better.

And so the end comes. We extend our best wishes to our sister publications, both on and off our campus, to those who have traveled the last lap and to those who continue. May we all be able to say at the end of the next year,

*"Something accomplished,
Something done."*

CHANGE is the immutable law. Eternal adaptability is the price of survival. Competition and Change march together as one.

Together they plan new things to

supplant old things, to dominate new markets, and to wrest the patronage from old-time customers and customs. Together they see to it that a commercial house of a century's standing may be destroyed with bewildering suddenness. At the same time an infant enterprise becomes overnight a national institution.

The mortality tables of Messrs. Dun and Bradstreet are grim reminders of the rigors of business endeavor. There were 23,146 failures last year—the second greatest number in our business history. Liabilities were almost \$655,000,000, the fourth largest loss recorded.

Wreck and ruin are the inexorable toll of business unpreparedness. Bradstreet attributes 40 per cent of the failures to "incompetence" and "inexperience." Ignorance is a plainer word.

The men and firms in that 40 per cent were no match for changing conditions. Competition saw to that. Competition never rests. Competition may be the life of trade but it also is the death of traders.

Yesterday is yesterday. The "good old days" pay no dividends in the present. Gone are the fancy vests, congress gaiters, night shirts, home-cured meats, homemade bread, high-wheeled buggies, lively stable and the primitive plumbing of an age that found amusement in the parlor stereoscope, the photograph album and the magic lantern. Change and competition! The commercial collisions of silk and rayon, leather and rubber, coal and oil, gas and electricity, ice and mechanical refrigeration are the stuff of which headlines are made.

Who can read the riddles of production and distribution of tomorrow or grasp the impacts of science on established markets?

Who can measure the possibilities of air transport, of radio, of television, of nitrocellulose lacquers, of "dry ice," of interconnected power, of the reclamation of industrial waste?

Since 1923 we have added 35 billions in dwellings, stores, offices and factories to the 70 billions we possessed five years ago. Only the names of cities endure; landmarks and tradition must give way. Everywhere the old—buildings and machinery—are destroyed to give place to the new.

Out of the flux and ferment emerge the victors. Men clear-eyed, alert, resourceful, they win that all of us may live more fully. It is the law. The world steps aside to let any man pass who can see a year ahead.

—MERLE THORPE

COLLEGE NOTES

A Record of Campus Activities

NEW BOOKS IN THE LIBRARY

BROWN, CHARLES R. *Where Do You Live*. A collection of addresses given to the students of Yale and other colleges by the dean of the Yale divinity school. They are significant in their insight into the attitude that cares more for honesty and fair play than ritual.

DULL, RAYMOND. *Mathematics for Engineers*. A text that supplies a place between text book and reference book in an adequate manner.

KROEBER, A. L. *Anthropology*. This interesting volume by a University of California professor sums up the science of anthropology, defining the main problems and offering such solutions as seem to have been proved valid.

NATIONAL RESEARCH COUNCIL, BULLETIN 59. *Chemiluminescence*. A clearly written bulletin that gives a very good idea of the present knowledge of a group of interesting phenomena. A list of 200 useful references to original literature for the research worker is also given.

NATIONAL RESEARCH COUNCIL. *International Critical Tables*. Volume 3.

WILSON, S. P. *Pyroxylin, Enamels and Lacquer*. This is a second edition of a well known text. Most of the new material has been obtained from sales articles and not from first hand knowledge.

Among the new and interesting novels are:

BROMFIELD, LOUIS. *Green Bay Tree*.

CATHER, WILLA. *Death Comes to the Archbishop*.

DEEPING, WARWICK. *Sorrell and Son*.

GIBBS, PHILIP. *Middle of the Road*.

HEMON, LOUIS. *Maria Chapdelaine*.

STERN, LOUIS. *Matriarch*.

WALPOLE, HUGH. *Cathedral*.

WILDER, J. T. *Bridge of San Luis Rey*.

The Senior Banquet, held Tuesday, May 1, was the last social gathering of the lofty seniors before leaving the portals of Armour. The banquet carried with it the characteristic atmosphere of the Class of '28. It was different, it was peppy, and yet through the entire affair there seemed to loiter that quiet dignified air of our Seniors.

The Senior Banquet was held in the Italian Room of the Allerton Club. The entertainment was good, the speakers interesting, the gathering spirited. But then followed those things that made this banquet the unusual.

The Allerton Club indoor golf course, the largest and finest indoor golf course in the world, was then thrown open for the use of the seniors. Those not caring to play golf remained in the Italian Room to take part in a bridge party that had been planned for their benefit. Prizes were offered for the best golf and bridge scores of the evening. As the midnight hour approached and the last social gathering of the seniors came to an end, many regretted that graduation day was almost here.

OUR VARSITY CAPTAINS

TENNIS

George Jennings

Our tennis team has an almost unbroken string of victories for the last three years, being beaten only once and that on an indoor court. A large share of this success is due to George Jennings who has been elected captain for the second time. His steady



George Jennings.

playing and even temper have helped his teammates to win many hard fought matches. In his three years of playing on the team George has never lost a match. He is now ranked eighth in Chicago and eleventh in the middle west. As he is just twenty-one, he has a bright future.

George makes a business of winning state tournaments in the summer. This last year he won the Wisconsin State Men's open single and double championships, the Hamilton Park closed singles, the United States Public Park doubles, the Michigan State doubles, the South Town doubles, and was runner up in the United States Public Park singles, the Michigan State singles and the South Town singles. Also he reached the semifinals in the Culver Boys' Tournament singles in 1925.

Jennings was born January 20, 1907, in Chicago. He attended Calumet high school. In 1924 he entered Armour as an electrical. He has won his letter three times in tennis and twice in baseball. He has played varsity baseball two years and basketball one season. George is a member of the Phi Pi Phi fraternity, the American Institute of Electrical Engineers, and the Honor A society.

Out of consideration for the tennis team, Jennings will remain at school for another year.

TRACK

On March 28 the Track team was beaten in a triangular meet at the Chicago Normal gym. Crane, who evidently has a strong aggregation this year, led with 57 points. Armour took 37 and Chicago Normal brought up the rear with 26 tallies. The bright spot of the meet was Paul's toss of 43 ft. 9 3/4 in. for a new school record in the shot.

April 14 the team again lost in a triangular meet at the University of Chicago gymnasium. Sears Roebuck "Y," the city Y. M. C. A. champs, nosed them out by one point, 38 1/2 to 37 1/2. Chicago Normal again took third with 21.

This ended the indoor track season. Spring track will be in full swing just as soon as the weather permits. With the team working out on our own track better results are hoped for.

ON March 8, 1928, Prof. Albert A. Michelson of the University of Chicago addressed the student body on the subject *The Measurement of the Velocity of Light*. There is no greater authority on this subject than Professor Michelson. The entire student body took advantage of this opportunity to hear a comparatively brief but extremely interesting explanation of the experiments that Professor Michelson has already performed and also those which he plans to perform in the near future on the velocity of light.

Professor Michelson told of his experiences in the United States Naval Academy and how he first became interested in the study of the velocity of light. While an instructor at the Naval Academy he was asked to give a lecture to the students of a certain class on *The Velocity of Light*. He obtained some apparatus with which to demonstrate, in his lecture, the manner in which Foucault, in 1862, determined the velocity by means of the displacement of a beam of light reflected from a revolving mirror. Much to his surprise he discovered that his observations agreed very closely with those obtained by Foucault. This aroused his interest and the Naval Academy not only permitted, but urged him to carry on further experiments in this field. He left the Academy and has been doing research work ever since.

A. I. E. E.—A. S. M. E.

On April 19 and 20 a joint inspection trip was made to some of the larger plants of Milwaukee by the branches of the A. S. M. E. and the A. I. E. E. A total of ninety juniors and seniors left Chicago early Thursday morning on a special train on the Chicago, North Shore & Milwaukee Electric. The Skokie Valley and the North Chicago substations of this road were visited en route, and after arrival the party were the guests of the Allis Chalmers Company at luncheon

in their plant. During the afternoon the pattern, forge, foundry, erecting, and testing shops of the plant were visited.

Thursday evening the group was entertained royally at a banquet at the Plankinton Hotel, which was the headquarters of the party. Representatives of the Milwaukee Chamber of Commerce, the Westinghouse Lamp Works, and the Cutler-Hammer Mfg. Company gave interesting talks, the first welcoming the group to the city, and the others telling of the manufacture of their products. The regular program of the spring smoker of the A. I. E. E. was presented at this time, and then the mechanicals brought out a surprise in the form of dancing and musical acts by Milwaukee talent. Sid Cohen, H. Eichen, and W. Thomas put on their usual funny entertainment, so the evening was well spent.

The next day a visit was made to the Lakeside power plant which furnishes practically all the power used in that section of the country. There are five units installed, besides a 1200 lb. pressure boiler. The present capacity of the plant is 167,000 kw. The plant uses pulverized coal exclusively, and is one of the most efficient in the country.

Friday afternoon the party separated, the mechanicals going to the plants of the A. O. Smith Corporation and the Harnischfeger Company. The automatic machinery alone at the A. O. Smith plant was worth coming to see. The electricals went to the plants of the Cutler-Hammer Company and the Westinghouse Lamp Works.

Many of the party returned to the Plankinton for dinner Friday evening. The return trip was also made on the North Shore line.

The work of the seniors in both branches is now over, and they turn the organizations over to the junior members with best wishes for next year.

JUNIOR PROM

The Junior Prom is always the outstanding event on the school's social calendar and as such speaks for itself. This year, however, besides being the outstanding social event it marks a new era in the presentation of these annual Junior Formals. This Prom, to be given on May 18, will be a supper dance. Everybody is enthusiastic over the introduction of this new standard and is greeting it with high interest.

It will be held in the exclusive Balloon Room of the Congress Hotel, and the food will be of that incomparable quality that only the Congress is in position to offer. Music will start at nine o'clock and will continue until two. The supper will be served at twelve.

As this goes to press complete final arrangements have not been made. The all-important question of who the orchestra will be has not been decided. You may rest assured, however, that it will be one of the leading ones and that in its particular standing it will rank as high among orchestras as the Balloon Room in the Congress ranks among ballrooms, and that's sayin' somethin'!!!

Due to the fact that the Junior Class, in order to make this affair the most elaborate of its kind yet held, is giving out a greater value per bid than that bid returns to them, the number of bids will be limited. Of course, all juniors and seniors will be invited, but the number of outsiders and lower classmen will be limited. The bids will be out soon, and will sell for seven dollars and a half.

THE Honorary Fraternity Dance on Friday, April 27, marked the finale of a splendid season of informal dances. It was held in the cozy Italian Room of the Allerton Club overlooking the lake and the Gold Coast.

The alumni turnout was unusually good, many of the more recent classes being well represented. Many were the handclaps and smiles as the honorary men of other years mingled with the active chapter members of today. The music was fine, the night was

Childhood's Renewal

*Once more we lie with shaded eyes
Within the warm and fragrant grass,
And wander through the May-day's
skies,
Or sail within the clouds that pass.*

*Once more we sit beside the stream,
And cool our feet within its flow.
The paddles drip within our dream.
We hear the cataract below.*

*Once more the meadow lark afar
Sweeps through the dawn with
golden wings.
Tonight beneath a pale white star,
Brown Philomel in sorrow sings.*

*Once more we find a milk-vained stone
Washed pure and bright by April
showers;*

*Once more we trace its lines alone,
Beneath the pink-white apple-blossoms.*

*I know not where the long years go
That vanish as we dream again;
If on that streamlet's silver flow,
Lost where it finds the silver main.*

*Or, if like snows that hid the bloom
Within dear seeds unfolded yet,
They melt where all these lights il-
lume
Those grassy meads we ne'er forget.*

*I only know that everywhere
This strange dumb life hath found
a tongue,
And in this breath of May-day air,
God once again hath made me
young.*

—F. W. GUNSAULUS.

right, and the fine fraternal spirit that enhanced the dance seemed to linger over the ballroom as the merry makers went about in their revelry.

The committee consisting of G. H. Von Gehr, chairman, W. M. Horn, E. B. Kapke, I. B. Luth, and G. A. Crapple are to be commended, not only for the splendid dance, but also for their efforts in getting the alumni to attend the dance.

CIRCUS DAY

The plans for Circus Day are in the making and many novel ideas are being developed. The date has been definitely set for May 19, and arrangements have been made

to have the entire program carried on at the 132nd Armory in case of rain.

The Junior Marshal, Wm. Berry, has appointed five men with their respective duties to assist him. They are:

L. P. Brown.....Athletics
F. D. Gedelman.....Freshman Adviser
J. W. Manz.....Sophomore Adviser
V. A. Peterson.....Announcer
D. L. Williams.....Fraternities

The Pentathlon, Inter-Fraternity Relay, and tennis meet will be held in the morning. The winners of the Inter-Fraternity Relay will be presented with track shoes instead of a cup, as has been the custom in previous years.

Each fraternity is urged to put forth every effort to make their stunt original and full of pep in order to promote keener competition.

Many of the details for Circus Day, which have not been definitely settled, will be disclosed at a later date.

ST. LOUIS CONVENTION

The entire senior chemical class and five members of the junior class left Chicago early Monday, April 15, to attend the convention of the American Chemical Society at the Chase Hotel in St. Louis. Those of the party who arrived in town before evening attended the informal dinner dance, the others inspecting the city by moonlight.

The departmental lectures started in full swing at 8:30, Tuesday morning, and continued throughout the day and Wednesday. On Tuesday evening, two special addresses were given, one by C. W. Parr, who spoke on the problem of Sanitation of the Air, and another by Dr. W. J. Mayo, of Rochester, Minn., on *The Relation of Biochemistry to Medicine*. On Wednesday afternoon, the group left the convention and visited the Monsanto Chemical Works, where we were shown the commercial preparation of chlorine, sulphuric and hydrochloric acids. Another special address was given that evening, in which two men showed experimental evidence that some oxidizing agents were extremely efficient fire extinguishers. The Eastman Kodak Company also showed moving pictures on the construction and movements of atoms.

Thursday was devoted to inspection trips. The first was made to the St. Louis Water Works, located north of the city, on the "Chain of Rocks." The water, taken from the Mississippi, was filtered and treated, supplying the entire city. The group then went to the LaCede Christy Clay Products Company, where we saw the entire process of making bricks and piping, from the clay pits to the shipping department. After that, we went with a large number of members of the society to visit the famous Anheuser Busch Breweries. Since prohibition, the plant has not been operating at full capacity, but has turned to the production of bran mash, corn products, etc. We were informed by our guide that ours was the first party to have been through their dealcoholizing department since prohibition. This entire section is under the padlock and supervision of the U. S. government. The trip was concluded with a wonderful lunch in their reception room, at which the beverages supplied were any of those produced by the company. Our party did full justice to the meal—and particularly to the liquid part of the repast.

We left St. Louis early Friday morning, and visited the Illinois Glass Company at Alton, Ill. The inspection concluded late in the morning, and our group broke up into travelling parties, headed for home.

FRATERNITIES

Let this be a world of friends—Hubbard

TAU BETA PI

Beta Chapter of Illinois wishes to announce the pledging of the following men: L. F. Bernhard, H. Christiansen, J. Hommes, F. H. Juergensen, H. R. Lutz, A. J. Stabovitz, F. C. Theede, W. M. Horn.

W. M. Horn has the unusual distinction of being pledged in the last semester of his senior year, an irregular procedure but one that seems justified in this case. The pledging smoker was held on Tuesday evening, April 3, at the Triangle house.

The chapter is cooperating with the other honorary fraternities on the campus in holding the Interhonorary Dance on April 27 and also the Interhonorary Initiation Banquet on May 10. This last affair is the outgrowth of an attempt to reduce the number of banquets in the second semester.

SPHINX

Sphinx has again taken the lead in being responsible for the issuing of a new publication, the *Armour Tech News*. A committee composed of W. J. Zenner, F. D. Payne and Elmer B. Kapke investigated the costs of such a publication and drew up a tentative schedule upon which to operate if Sphinx agreed to assume responsibility for any financial loss incurred in the trial issues. This new weekly will open many opportunities to the underclassmen who are interested in work of this kind.

The following Juniors are wearing the black and gold pledge ribbons of Sphinx: W. H. Berry, L. F. Bernhard, L. P. Brown, H. H. Dozois, B. W. Hindman, John Hommes, R. E. Johnson, C. P. Ware.

SALAMANDER

Most of us are now on the "home stretch" and are all set to finish the race with all of the energy remaining in us.

The final activities of the year for Salamander were the Inter-Honorary dance and our spring initiation, at which time Harvey Goranson and John Hommes became members of Salamander. The ceremonies were held in the rooms and were followed by the Inter-Honorary banquet on May 10.

PI TAU SIGMA

Delta Chapter of Pi Tau Sigma announces the pledging of the following men: A. L. Barce, A. L. Scully, G. H. Smith.

These men were pledged at a smoker held on March 22. One of their pledge duties will be the making of arrangements for the national convention to be held in the fall. They also must attend the Interhonorary Dance to be held on April 27. They are fast learning the ideals, purposes and traditions of the fraternity.

INTER-HONORARY COUNCIL

On Thursday, May 10, 1928, the honorary fraternities represented in the Inter-Honorary Council held a joint initiation banquet at the Illinois Woman's Athletic Club. This affair climaxed the initiation ceremonies of these fraternities.

Prof. J. C. Peebles acted as toast-master. Dr. John Timothy Stone, pastor of the Fourth Presbyterian Church of Chicago, was the speaker of the evening. He told of Dr. Gumsauls' conception of a great technical school for poor as well as rich, and of the founding of Armour Institute on



this idea. He also appealed to the men to maintain a spirit of broad-mindedness throughout life, and to choose and pursue an avocation as well as a vocation.

It is hoped by the honorary council that this form of spring initiation banquet will be an annual affair.

CHI EPSILON

Thursday, March 29, 1928, marked the close of our fifth year of worthwhile endeavor and existence at Armour Institute of Technology. During these years we have worked for and developed an ever stronger bond of friendship and understanding between the faculty and students of the department of civil engineering. In this we feel that we have justified and maintained our recognized and respected position among the honorary fraternities at the Institute.

During the present year, we have adopted a new procedure in the matter of initiations, and feel that we have made a change for the better. It was customary to have a lengthy pledging period during which time the pledges were put through the usual and time honored paces. We, as actives, feel that such formalities have no place in an honorary fraternity, and in many cases they lessen the pledges' respect for the organization and some of its members. We have found that to present pledging to Chi Epsilon as a reward for something accomplished, something done, makes for quicker and stronger friendships in the all too short year of association as pledges and brothers in Chi Epsilon.

On March 9 we pledged the following men, and initiated them at our fifth anniversary celebration on March 28: H. Christiansen, H. Nissen, R. Stellar, G. Montgomery. The formal initiation took place at the Theta Xi house and was followed by an informal dinner at the Atlantic Hotel. After dinner we were entertained with *Good News*, a snappy musical comedy at the Selwyn Theatre.

PHI LAMBDA UPSILON

Omicron chapter closes a most active year of varied activities. One of the high lights of the numerous affairs was the pledge smoker. These smokers are always of a highly interesting and entertaining character and everybody has a hilarious time with the possible exception of the candidates.

The alumni were exceptionally well represented at the smoker, there being twice as many alumni as active members present. Many members who had not appeared at this function for several years attended. Tom Camp of '27 brought two brothers from the Theta chapter at Ames, Iowa. With a surprisingly small amount of coaxing all present made a vigorous attack on the refreshments.

It is with pleasure that Omicron chapter announces that G. C. Dufour will carry the red and blue ribbons.

PHI KAPPA SIGMA

As the school year draws to a close Alpha Epsilon of Phi Kappa Sigma finds herself in a deluge of activities.

On April 18 we had the pleasure of entertaining our professors at our annual Faculty Banquet. We are happy to receive the hearty cooperation of the faculty in this get together.

We are looking forward to Junior Week with anticipation. Junior Week is undoubtedly the biggest and most enjoyable event of the entire year.

Then there is our annual picnic and the Senior Farewell party to close a very successful year for Alpha Epsilon.

Brother Dave Allen, who was married in July, 1926, to Miss Kaus of Cleveland, is now the proud father of a baby boy. We wonder if Dave will raise his boy to be an engineer.

SIGMA KAPPA DELTA

We are now approaching the time of the year which everyone has been looking forward to for a long time. To some of us comes only the end of a school year, but to others comes the start of a new life, a real life, where it takes a real man to win. To the graduates, and especially to our own

(Continued on page 148)

TO THE GRADUATING CLASS

(Continued from page 121)

bilities let someone else assume them and be faithful to your appointed task.

But now, at commencement, when you leave the shelter of college walls, come into clearness with your-self and in your heart of hearts decide what "kind of a fellow" you are going to be—the faithful worker under guidance and direction, or the responsible director of the work of others.

Set a limit to your ambition, to your hopes and expectations by your ability and character (Know thyself!), or strike out with never flagging enthusiasm for the highest prizes that brains, courage and high endeavor hold out to the exceptional man.

"The choice rests exclusively with yourself!" And remember,—no devotion to high ideals amounts to anything without the faithful performance of the actual daily tasks.

Life is no picnic, nor is it a Sunday school; it is neither a continual grind nor a pleasant meandering through flowery fields. It is mostly, as a French writer has said, what we *put into it*, rather than what we *get out of it*.

And thus, with your Engineering diplomas in hand, set out upon your journey, trusting your own powers to solve your problems in your own way. And may a kind Providence help you to stand on your own feet.

And always loyally keep in your heart the affectionate remembrance of dear A.I.T.

My hearty greetings to you all.

Your old Dean,

LOUIS C. MONIN.

THE CHICAGO TRAFFIC SIGNAL SYSTEM

(Continued from page 124)

and a half miles, is merely a system of timing several intersections along one thoroughfare in such a way that a vehicle traveling at a predetermined speed may traverse the entire distance without a stop. This speed for Broadway is 20 miles per hour. Every street in the Loop district could be considered as being a separate progressively timed street. This system has a double advantage over the commonly used synchronized plan whereby all of the signals along a given street operate on one timing. In the first place, under the synchronized system, every vehicle is bound to be stopped once every cycle. In the second place, under the progressive system no incentive is held out to the motorist to drive at more than the suggested speed as it will only

result in unnecessary stoppage at the ensuing signal.

The purpose of the coordinated system of control used in the central district is to enable a vehicle moving at a predetermined speed to traverse the entire district with a minimum delay. In setting this speed the necessary time required for the public-carrying street cars to stop for loading and unloading must be given due consideration, if the free traffic movement desired is to be obtained.

ANNUAL COST

	Entire System	Per Signal	Per Intersection	Per 4-Signal Intersection
Amortization-Depreciation	\$ 47,472.00	\$40.33	\$172.63	\$161.32
Power Cost	24,000.00	20.39	87.27	81.56
Maintenance and Operation.....	30,000.00	25.49	109.09	101.96
Total Annual Cost.....	\$101,472.00	\$87.21	\$368.99	\$344.84

The timing in the Loop district is the result of two years of study and practice. The pliability of the central control has proved its worth, as day to day conditions sometimes require special timing at various locations; any improperly related intersection makes itself noticeable immediately by increased congestion. A case in point was the closing of the Clark Street bridge recently for repairs, the attendant traffic rerouting in the north end of the Loop being immediately offset by revised timing at affected intersections.

At present the cycle used is varied as follows:

7:30 a.m. to 8:00 a.m.....	55 seconds.
8:00 a.m. to 4:30 p.m.....	60 "
4:30 p.m. to 6:00 p.m.....	65 "
6:00 p.m. to 8:30 p.m.....	55 "
8:30 p.m. to 12:30 a.m.....	50 "

Further variations are used on Saturday afternoons, Sundays, and holidays.

The original installation of 49 Loop and 87 outlying intersections was made possible by an appropriation of \$345,000 from the vehicle tax fund. Subsequent installations have been made possible by means of bond issue funds specifically voted for that purpose. The total amount expended for traffic signal installation to date is \$645,000, which covers all labor, material, and overhead, involved in installing 1177 signal units at 275 intersections.

The maintenance and operation of the present system is handled entirely by the employees of the Department of Gas and Electricity of the City of Chicago. This cost for the entire system as it now stands is approximately \$30,000 per year.

At outlying installations the Commonwealth Edison Company furnishes power without meter or time-clock at a flat contract rate based on 24-hour

operation. The total annual power bill for the system, including the Loop installation is \$24,000.

Making the fair assumption that the life of the installation will at least equal the period over which improvement bonds are amortized, the depreciation, figured over 20 years on a four per cent basis, is equal to \$47,472 per year.

The total annual cost of the installation may then be summarized as below:

When it is considered that as many of the 275 intersections now signalized, officers formerly required solely for traffic regulation are now released at least a major portion of the time for other duties, the expenditures for this work are readily justifiable for this reason alone.

In addition, however, the signals provide valuable protection for pedestrian and motorist, and have been proven by actual test before and after installation to speed up traffic to a remarkable degree. This is particularly true of the Loop system which was an object of widespread interest before and after installation. Interested traffic agencies, and some of the daily papers, made thorough tests during the early days of the operation of the system; all agree that great saving in time has been accomplished.

A real understanding of the varying degrees with which the pedestrian and motorist are able or willing to assume the added responsibilities which conformity with an orderly system of traffic regulation would impose upon them, can best be gained by first-hand observation of a few non-governed and governed intersections during rush and non-rush periods.

After the thorough test afforded by two years of actual operation, the Police Department, the Traffic Committee of the Chicago Association of Commerce, the Chicago Surface Lines, officials of taxicab companies and motor clubs, and the public in general, have all expressed entire satisfaction with the operation of the entire system and urged that its systematic expansion be continued until all warranted locations within the City limits are provided with the same vehicular and pedestrian protection which those intersections already signalized now possess.

THE ARMOUR ALUMNUS

J. WARREN McCAFFREY, '22, Editor

AALBERG JOINS GENERAL ELECTRIC COMPANY

Was afforded an opportunity to shake hands and say good-bye to John O. Aalberg, '24. He drove out to the Institute to say good-bye to some of his friends here the day before he left for Schenectady, N. Y. He expected to give his Wills Sainte Claire a thorough road test by driving to that city.

He had received and accepted an attractive offer from the General Electric Company. That was the reason for his permanently leaving Chicago for Schenectady. His work will be in connection with a recent development in moving picture work (I believe Johnny used the word phonophone). He has been a moving picture operator for some years, even while studying at Armour Institute. Later when the interest in vitaphone grew he was one of the first to jump into that line of work and was in charge of the picture *Wings* playing at the Erlanger.

We congratulate Johnny on his new position and feel confident that he will make the most of the opportunity. We extend to him our best wishes and hope that he will inject a little enthusiasm among his fellow alumni in that portion of New York so that we may soon be able to install another branch of the General Alumni Association.

A great deal is written in the daily papers about the achievements of the architectural students of Armour Institute of Technology. However, the following bit of news is of a little different character and certainly worthy of mention here. Mrs. Rudolph J. Nedved, '25 (Elizabeth Kimball), is the first woman member of the Chicago chapter of the American Institute of Architects. Her work both individually and in partnership with her husband has been of a quality to warrant this honor. She has won prizes for sketches and water color paintings, and with her husband, who is also an Armour graduate of 1921, has studied architecture in Europe.

Was very surprised to receive an announcement from Consoer, Older & Quinlan, Consulting Engineers, in the Marquette Building, Chicago, which said in part, "On Jan. 23, 1928, Mr. George B. Mulloy joined our organization in charge of a new department of Industrial Engineering.

"Mr. Mulloy has been employed by Armour and Company for the past twenty years and during the past few years has filled the post of Assistant Superintendent of Motive Power and Chief Combustion Engineer. This experience qualifies Mr. Mulloy for the work he is undertaking as a member of our organization."

The Armour Alumnus extends its best wishes to George Mulloy, '07, in his new position and feels confident that he will be very successful. His reputation and experience certainly qualifies him for any similar line of work.

MERGER EFFECTED BY ALUMNUS

The distinct honor of being the originator of the Pennsylvania-Dixie merger, which resulted in the consolidation of four of America's largest cement companies into the Pennsylvania-Dixie Corporation, aggregating \$40,000,000, falls to Ellis Soper, '09, an engineer and an alumnus of Armour Institute of Technology, who after twenty years of study and effort directed chiefly to the cement industry, has attained an international reputation in this line of endeavor.

Mr. Soper was the prime mover in the Dixie Portland Cement Company, of Chattanooga, in 1926. For a year he gathered data and information in relation to the proposed consolidation before presenting it, together with options, to New York bankers early in 1926. It is recognized by the industry generally as the best group of high class mills in the country.

Mr. Soper was construction engineer of the Market Street bridge in Chattanooga, during the period that the foundations were laid. He made daily inspections before and during the work of excavation and concreting. This involved going over every foot of surface of rock exposed in those excavations which could not be pumped and into which the concrete was deposited under water. This necessitated going down into twenty to forty feet of water in a diving suit, laying flat, crawling and feeling with the hands, since the muddy water made it impossible to see. As many as three inspections of this kind were made in one day.

He has built many cement, fertilizing and lime plants in the United States, Canada and Cuba, and has done consulting engineering work in Central America and Europe. Mr. Soper holds a degree of Bachelor of Science in Mechanical Engineering, received in 1909 from Armour Institute of Technology, and the degree of Mechanical Engineer, received in 1913 also from Armour Institute. He is a member of the American Society of Mechanical Engineers, The American Society of Civil Engineers, and the American Institute of Mining Engineers.

Mr. Soper calls Nashville his home; owns property on Lookout Mountain, and is proud to be called a Tennessean.

John L. Nagle, '15, stepped into the Institute to renew old acquaintances. He may not be so well known among the alumni because he only attended the Institute two years. However, his work in the civil engineering field since has been of a very high caliber. He is at present serving on the Arlington Memorial Bridge Commission with offices in Room 1031 of the Navy Building, Washington, D. C. His home address is 3800 14th St., N. W., Washington, D. C.

Anticipating their class reunion in 1930, John Urban, '27, and Louis Allaire, '27, are

(Continued on page 150)

FIRE PROTECTS IN DES MOINES

The Armour Alumnus received the news from its staff correspondent in Cedar Rapids, Iowa, that on March 13, a group of Iowa Inspection Bureau men got together for an exchange of reminiscences. Those who assembled in the Des Moines office of the Iowa Inspection Bureau were, Leland R. Hoff, '25, Alired J. Danziger, '26, Frank Heiner, '27, and Louis P. Allair, '27. The report is that they had a great time discussing their days at the Armour Institute and their experiences since graduation.

Leland Hoff, who was formerly on the track team at the Institute, is now in Sioux City working for the Iowa Insurance Service Bureau. In 1927, one fatal day, he took unto himself a wife whom he had met while working in Arkansas.

Danziger is in the sprinkler division for the Bureau and is still unmarried. Allaire is also unmarried and is working out of the Cedar Rapids branch office of the Bureau.

Frank Heiner, who would have graduated with Allaire, had he remained in school, is also working out of the Cedar Rapids office and found while there that the girls of the town were quite attractive. This is evidenced by the fact that he selected one to become Mrs. Frank Heiner.

How is this for quick work? He only graduated in June, 1924. "Mr. and Mrs. Alphonse L. Mathis announce the marriage of their daughter Pauline to Mr. Louis Henry Pfohl on Monday, the twenty-fifth of July, one thousand nine hundred and twenty-seven at Mound Chapel, Sinsinawa, Wisconsin."

Because the high schools in northern Indiana were having a musical contest on Friday, April 13, the schools were closed, which fact enabled Robert E. R. Broad, '23, to come into Chicago and visit Armour Institute. While looking up some of his old professors and associates when he was in school, we had the good fortune of meeting him.

"Petie" graduated in mechanical engineering from Armour Institute in 1923. Being bent upon possessing a great deal of learning, he then enrolled at the University of Chicago where he spent about two years in the School of Education. He is now instructing in mathematics and mechanical drawing at the Hobart Township High School in Hobart, Indiana.

On remarking to him that back in our days together at A. I. T. I never believed he was cut out to be an engineer, he assured me I was correct. He is entirely taken up in his work as a teacher at the high school and insists that he could not be happy in any other line of endeavor. Besides his pleasant occupation and quiet rural life in Hobart, "Petie" Broad's life is otherwise made happy, for he is married and has a four month old baby girl.

THE ROOT OF TECH.

IT'S "SQUARE."

Man is the only animal who can laugh at himself

YOU CAN DO IT BETTER WITH GAS

An electric specialty company had a peculiar damage suit filed against it. The plaintiff's petition was written thus:

"Plaintiff alleges that this defendant represented to her that this range would not become heated on the upper surface of the oven. That said plaintiff, relying wholly upon this defendant's representation, placed her bath tub in the kitchen near the range. That, upon emerging from the tub, the plaintiff's foot accidentally came in contact with the soap upon the floor and she was thus compelled to sit upon the range. That, although she arose therefrom in all diligence and haste, she discovered she had been branded 'H-47'."

REVERIE

Some rave about their nightcaps of steaming vintage rare.

You talk about your soda and that at New Year's you did forswear.

But when my day is over and the witching hour is near,

I crave a glass of H₂O that's cool and crystal clear.

You told me it was flat and stale and lacked the flavor of mellowed ale

But still to satisfy my crave to taste the tasteless stuff

I pour into my paunch each night enough to oil what's rough.

I'm indiscreet, I know, dear friends, to air this secret vice

For some fine day I'm sure I'll find that it's against what's right

And those whose booze is outlawed will take it as a grudge

And legislate against me, because it isn't nice for me to wallow in my pleasures

While they must do what's right. Ha! Ha!
—the barb.

They tell us that Benny never has to finecomb his hair; they get dizzy going round and round in circles, and they fall off.

"Do you ever allow a man to kiss you when you're out motoring with him?"

"Never. If a man can drive safely while kissing me he's not giving the kiss the attention it deserves."

Betty: Do you have any green lipstick?
Clerk: Green lipstick?

Betty: Yes, a railroad man is going to call on me tonight.

THE ARMOUR BLACKSMITH

(Duc apologies to Mr. Longfellow for this)

Under the spreading machinery,

The Armour Blacksmith stands.

The smith, a mighty (?) man is he

With large and tired hands;

And the muscles of his brawny (?) arms

Resemble rubber bands.

His hair is crisp, and brown, and long,

His eyes, the clock would scan.

His brow is wet with honest sweat,

He earns the least he can.

And looks the whole class in the back,

For they're busy to a man.

Week in, week out, from two till five,

You can hear his bellows blow,

You can hear him swing his heavy sledge

With irregular beat and slow

As an Armour heart is beating

When the quiz marks turn out low.

Toiling—rejoicing—sorrowing,

Onward thru assignments he goes;

Each afternoon sees some task begun,

Each evening, praps its close.

Something attempted, little done

Has earned a night's repose.

The new clerk came out of the boss' office looking extremely puzzled.

"Did you tell him where he would get off if you didn't get the raise?" said one of his fellow clerks.

"Yes," replied the pen-pusher, "I told him I'd leave him flat if I didn't get it."

"What'd he say to that?"

"Why, he told me he hadn't time to sing it, but I would find the firm's answer in the second line of *Hail, Hail, The Gang's All Here*."

"Pa, what does it mean here by 'diplomatic phraseology'?"

"My son, if you tell a girl that time stands still while you gaze into her eyes, that's diplomacy. But if you tell her that her face would stop a clock you're in for it."

—Pitt Panther.

"My father occupied the seat of applied science at college."

"Dat's nuttin. Me old man occupied the seat of applied electricity at Sing Sing."

—Goblin.

Joe: "Mahel says she thinks I'm a wit."
Jim: "Well, she's half right."

FARMER SOLOMON

In Missouri, where they raise more mules and children than in any other place in the world, a certain resident lived possessed of seventeen mules and three sons. In his will he disposed of the mules as follows: one-half to the eldest son, one-third to the next, and one-ninth to the youngest.

The administrator who went to divide the property drove a span of mules out to the farm, but when he wanted to divide the seventeen into halves, thirds, and ninths he found it was impossible with live mules; fractional mules not being very valuable, he unhitched one of his own, giving it with the other seventeen, making eighteen, which he proceeded to divide as follows: One-half, or nine, to the eldest; one-third, or six, to the next; and one-ninth, or two, to the youngest. Adding up nine, six, two, he found that it made seventeen, so he hitched up his mule and went home rejoicing.

"DEER JOSIE"

Thoi'thoid and tha tracks.

March 17, hooray St. Pat.

To tha sweethart of Armour Tech

Tha wunderful Josephine Schpeck:

Time has sped since last I wrote,

So excuses are in order.

I've worked and slaved on tha many things On which our dear profs dote.

"One hour in class, three hours at home,"

Is tha mournful dirge they croon.

"Any questions pertaining to tha work?"

"If not: study tha volt, tha amp, and tha ohm."

In our social whirl there ain't much bizz; But I've surely never yet sen it fail.

That after a night at Frank's menage, The profs each ups and throws a stiff quiz.

How's yur mother, father and brother,

Fly Schpeck,

And the rest of the folks at home?

Have you still got that pesky cantankerous wreck

Of a car, that your dad used to swear at, by heck?

We ain't hardly got time for bridge or tea, And us engineers don't read no literatur.

Looks like five more years for my degree, Write soon, I'm lovingly,

H. P. E.

If Colonel Lindbergh is really sincere about finding a small place cut off from the rest of the world he ought to try a telephone booth.

Having been on the lookout for material for this—our final editorial—we waxed enthusiastic when a cartoonist of quite some renown offered to let us use one of his masterpieces, inspired by many erudite members of the profession known as Architectural Engineering. His treatment of a subject at once so intriguing, and so abstract, prompted us to give it to you in its entirety.

How many poses can you identify? Each drafting room has one or more of these quaint characters. And their haunts are not confined to the realm of the Architects. No—by Gar, you find them everywhere we are a tee-square is an instrument—and not a toy. There's *Willie Climb The Table* kneeling all over the table polishing his pedal appurtenances on the glossy surface of a tracing. Then take a look at *The Hunchback*. The circus world certainly suffered a dire blow when that contortionist decided to take up the profession. The other evils are common enough to us all, and if there is one among you claiming exemption, "go, mark him well. High tho' his titles, proud his name, boundless his wealth as wish can claim; the wretch concentrated all in self, and doubly dying shall go down to the vile dust from whence he sprung; unwept, unhonored, and unused;" 'cause that guy is a liar.

MORE TRUTH THAN POETRY

Ah, pity the college wits; their lot is mean.

Suppression haunts the wretched college jokers; The faculty sourly censor their magazine.

They hear their efforts panned by college croakers—

Full many a joke is born to blush obscene,

And ne'er be whispered save at college smokers.

L. Granich,
C. C. N. Y., '20.

A bond salesman was endeavoring to interest a dentist in some bonds.

"Yes," said the professional man, "it looks good to me, but before I invest I will ask the advice of my bank."

To this the salesman retorted: "Certainly," and, after a moment, "by the way, Doctor, I shall soon be needing some dental work; will you recommend a good dentist?"

The Doctor saw the point.

OBEYING ORDERS

The stationmaster of the East Indian Railroad had been given strict orders not to do anything out of the ordinary without authority from the superintendent.

This accounts for his sending the following telegram:

"Superintendent's Office, Calcutta:
"Tiger on platform eating conductor. Please wire instructions."

—Ohio State Engineer.

ANOTHER INJUSTICE TO LABOR

MacDonald—"I 'ear Bill 'Awkins is suin' the company fer damages."

Meads—"Why, wot 'ave they done to 'im?"

MacD.—"They blew the quittin' whistle when 'e was carryin' a 'eavy bid o' wood, an' 'e dropt it on 'is foot."

—California Engineer.

Father—When I was young I thought nothing of a ten-mile walk.

Son—I don't think so much of it myself.



FINAL EXAMINATION

Steam Power Plant Engineering

1. Fine gas analysis shows.
(a) 60% Carbon—(plate rheostat).
(b) 99.44/100% Pure—(It Floats).
(Not an advt.)
2. Determine the correction factor for problem 1. (References—partner's quiz book.)
3. Find the factor of safety of 2 lb. of muddy water, and how would this affect embrittlement of the boiler plate?
4. How short is *Du Long's* formula?
5. Determine the quality (X) of hot air.
(Write to your congressman.)
6. Explain in detail the most economical method of shoveling super-heated steam into a grate.
7. If you swindled a man out of \$10,000, what would your conscience tell you to do, and why would you choose South America?
8. How would you explain the difference, if any, between guesswork, and engineering judgment?
9. How would you pass an obstacle with a steel tape, and why would you bend it?

Anxiously Awaiting Your Reply

And now we submit a problem to you, our trusty readers, a problem pertinent to the election period which will again agitate a peace—(pieceful) June. Here 'tis:—

"A Candidate controls 50,000 votes in April. If ordinary mine-run black gunpowder averages 12,000 B.t.u./lb., calculate the size of a *finapple* necessary to reduce the encumbrance of aforementioned candidate to 88 and 33/100%."

—the barb.

Jones bought an electric icebox to keep the iceman away from his wife. The iceman's taking up electricity.

N. M.
Ohio State U.

She (just back from Paris)—I can't go to the dance tonight; my trunks haven't arrived yet.

He—Good Lord! What kind of a dance do you think this is going to be?

—Tawney Kat.

Lecturer—Can anyone give me the meaning of the word auditorium?

Listener—Yes—from audio, hear, and tarsus, bull. A place where—

"That will do."

—Jack o' Lantern.

Patient—Doctor, what are my chances for recovery?

Doctor—Excellent; statistics show that one out of every ten gets well and the nine cases I attended before you have all died.

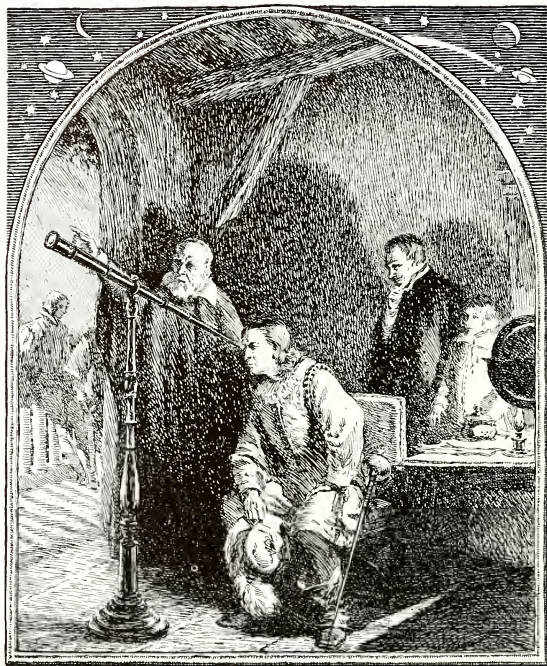
"Shirts that laugh at the laundry" are advertised by a certain firm. One of ours, bought elsewhere, has such a keen sense of humor that it arrived home the other day with its sides split.

Purple Parrot.

And so we come to the end of the voyage. We've tried to pilot the *Root of Tech* through a sea of good cheer, seasoning the light and frothy humor with more substantial fare, hoping to enhance the status quo of this department of the ENGINEER, and to banish the dull stodginess which so unnecessarily seems to accompany the dignified mien of the budding engineer. We hope we've succeeded, and reluctantly pass on, leaving the battle in the hands of another.

Goodbye, Good Cheer, and Good Luck.

H. P. E.



New Worlds for Old

LIKE Galileo, every pioneer seeks new worlds. In the telephone industry this has led to discoveries of ways and means to better service.

Telephone pioneers of yesterday hewed a way through intricacies of science, finance and business manage-

ment to establish the era of "distance speech."

Telephone pioneers of our own day *imagined* a 'cross-ocean service—and then made it.

Telephone pioneers of tomorrow will face the challenge of new and greater problems sure to arise.

Please mention The Armour Engineer

Vision led to transatlantic telephony

Vision guides the men responsible for the direction in which the telephone industry grows. They foresee what developments are needed and when—hence, among other things, long distance service anywhere whether from New York to Buffalo or to Berlin.



Equipment designed to carry the voice across the continent, curiously enough, led to equipment to carry it across the Atlantic... Inspired scientific research in Bell Telephone Laboratories is continually opening up whole new worlds of possibilities.

New worlds of manufacturing at Western Electric



Accurate measurement of light plays a part in pioneering new inspection standards.

All units of the Bell System are alike impelled by the urge to pioneer. Nowhere is this more typically true or evident than in the making of telephones

and telephone equipment by the Western Electric Company.

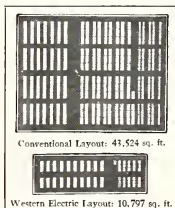
Imagine the methods of a half-dozen venerable industries completely revised. Imagine the time-honored customs in raw material purchasing challenged and radically bettered.

To help make better telephones, the Western Electric Company set out to create better ceramic products, better wire-drawing methods, better metal finishes. In every case, the existing art first had to be mastered completely and then im-

proved. In every case, a new world of exact, scientific methods was created.

In purchasing and in inspection, too, the rule-of-thumb methods of the past were replaced. The high-powered microscope eliminated guessing about raw material quality. The magnifying glass supplemented human skill in critical inspections.

To all this vast panorama of conquest of the material world there is no end. And rightly so. Like one bright constellation discovered in the sky, one world conquered leads to another.



Conventional Layout: 43,524 sq. ft.

Western Electric Layout: 10,797 sq. ft.

Redesigning an entire industry. New planning methods increased wire production per square foot area by 400%.

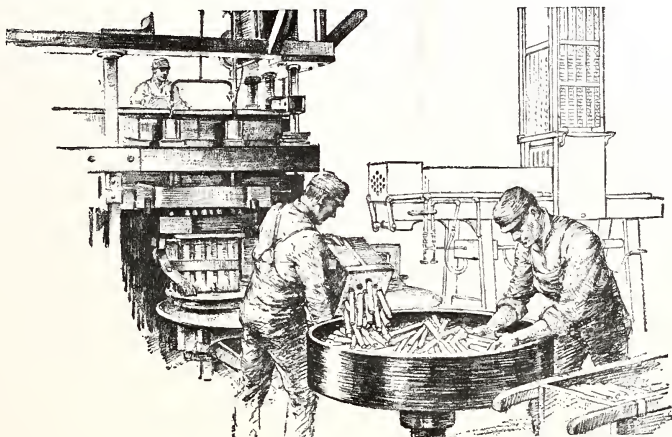
BELL SYSTEM

A nation-wide system of 18,500,000 inter-connecting telephones



"OUR PIONEERING WORK HAS JUST BEGUN"

Please mention The Armour Engineer



IT'S THE MAN THAT COUNTS

THE human element probably plays a more important part in the making of explosives than in any other manufacturing process conducted on a large scale. There is no machine in the great Hercules plants that has not a man for its master. Every motion it makes is watched. The results of its work are carefully checked. Nothing is ever taken for granted. No machine is looked upon as infallible.

For example, in the gelatin packing house a large machine fills paper cartridges with ^{*}Hercules Gelatin Dynamite. Although this machine works with almost positive precision and accuracy, every cartridge which comes from it is inspected twice to make certain that it is properly packed. One inspection takes place immediately after the

cartridge leaves the machine. Another before it is finally boxed for shipment.

The men who use Hercules Explosives know how dependable are the men who make Hercules Explosives. The Explosives themselves tell the story. In metal mine and stone quarry, at the bottoms of deep rivers and in the hearts of great mountains, wherever an engineer builds a city skyscraper, or a farmer blasts a ditch, Hercules Explosives live up to the name they bear.

• • • • •

^{*}As its name suggests, Gelatin Dynamite is plastic. It is made by dissolving nitro cotton in nitroglycerin and combining with certain other materials called "dopes". It is used principally for shooting in hard rock and in water.

HERCULES POWDER COMPANY

(INCORPORATED)

HERCULES POWDER COMPANY, Inc., 941 King Street, Wilmington, Delaware

Sign and mail this coupon for a free sample copy of *The Explosives Engineer*—the only magazine devoted to promoting safe and efficient methods of blasting about which every engineer should know something.

Name _____

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State _____

4115

AUTOMATIC TRAIN CONTROL

(Continued from page 144)

Operating from the governor is a system of countershafts, and cams which mechanically close the speed control circuits. To describe the actual operation of each cam and contact is not the purpose of this article, nor is it possible without the aid of labeled diagrams. However, some idea of the speed control mechanism may be gained if the things it accomplishes are noted.

The speed control mechanism establishes the maximum and low speed limits, and tapers the limit between these two values. It operates both the low pitched speed horn and the high pitched acknowledging horn. It measures a definite distance of 300 feet in which the engineer may acknowledge, and in case of his failure to do so at the end of that distance it deenergizes the electro-pneumatic valve which operates the valve applying the brakes. It measures out the half mile acknowledging points.

Some idea of what this apparatus looks like that does all these things may be gained by inspection of the photograph of the control mechanism case. The dynamotor is seen at the extreme left. The main governor with its oil tight case is adjacent to it. Shafts are seen to extend from this case into the control case which houses the cams, contacts, two-phase amplifier, and the master primary relay. Close inspection may reveal link connections between the cam riders and the glass-covered relay group.

The brake applying apparatus which executes the commands of the control mechanism consists of two devices—an electro-pneumatic valve and a brake valve actuator.

The electro-pneumatic valve, known as the E. P. valve, is employed for controlling the air supply to the brake valve actuator. When the magnet of this valve is energized it permits the manipulation of the brake valve handle by the engineer. When it is deenergized it causes the actuator to give a service application of the brakes without any action whatever on the part of the engineer.

The brake valve actuator is built to connect directly with the brake valve and its location is seen from inspection of the photograph of the engine cab, showing also the acknowledging lever. It operates the brake valve automatically to the service position, in precisely the same manner as the engineer, when he makes a manual brake application. After the brake valve has been operated by the actuator be-

cause of excess speed, it cannot be moved to the release position until the speed has been sufficiently reduced to be under the limit imposed. If the brake valve has been operated by the actuator for failure to acknowledge, it cannot be moved to the release position until the train has been brought to a stop.

Like the speed control mechanism the E. P. valve and the brake actuator are really quite complicated and cannot be described here in detail. There is one small part of the actuator, however, that is quite important and that is a bolt which is locked in position by a cylinder lock and key. The lock is so arranged that the key cannot be withdrawn from the lock unless the bolt is in position connecting the actuator to the valve, for automatic control. When the train is operating with train control cut out the key must be in the lock.

This key is attached to a small brass plate having the number of the locomotive stamped on it and is known as the "token." When a train enters track equipped for train control the engineer delivers this token to the conductor, which means that with the key out of the lock the train is connected for train control. The fact that the fireman has closed the clutch lever on the side of the tender is evidenced by the signal light, either green or yellow. The conductor is required to have this token in his possession when the train is operating in train control territory. When the train control must be cut out the conductor gives the token to the engineer and the fireman disengages the clutch. Thus the conductor and engineer are held jointly responsible for the cutting in and out of train control.

Installation of such complicated systems as a train control system is costly to be sure, but must really be reckoned an investment. The dividends of safer railroad operation are appreciable. Though it is too early, perhaps, to notice a marked effect of automatic train control, in making transportation safer and surer, more extensive application of such systems will surely give noticeable results. Many railroads, confident of the soundness of the investment, are making installations without legal pressure.

The spirit behind the man behind the throttle—that is the automatic train control system. Never erring in its guidance; ever alert for the impending.

Faults? The greatest of faults, I should say, is to be conscious of none.

—Carlyle.

A COMMENCEMENT ADDRESS

(Continued from page 131)

them how to meet the breaks of the game, the vicissitudes of life which come to us all.

Just now you are beginning the upward climb; every today is an accomplishment and each tomorrow an anticipated event. But when you reach the broad mesa-top of the middle years and the tempo of life slows down a bit, I fancy that the breaks, realized and anticipated, will add a spice to the game. For many of you, no doubt, some big break will bring a smashing victory; none of you, I hope, will ever consent to find therein a complete defeat. But every one of you, I feel sure, will find that all the charming nuances of life, the minor events which give shade and tint and color to your days, cluster around the breaks of the game. Days cannot be all alike when each one may, and sometimes does, bring with it a disappointment or a victory, a knock or a boost. So face the breaks of the game with courage and confidence; perhaps they will help you to victory, surely they will save you from humdrum and monotony.

You stand today where the path turns upward sharply. Behind you lie four years of preparation, of study and work and play; four years of friendships and pleasant associations. Before you stretches a great adventure, with all its lure and promise, with all its beckoning mystery. As you begin the climb, Alma Mater stands watching you and she waves *good-bye* and *good-luck*, a smile in her eyes, a benison on her lips.

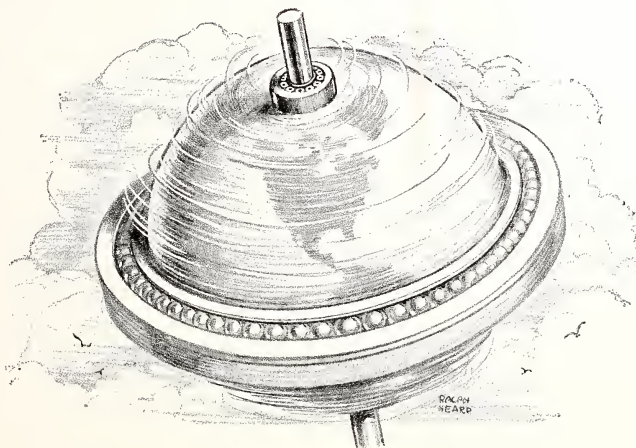
TELEPHONE CABLE MANUFACTURE

(Continued from page 130)

Another important angle of cable production is the operation of a giant lead press. Some time ago a huge mountain of iron and steel making smooth shining cable sheath out of the large gulps of molten lead it swallows at regular intervals, took its place among a row of similar but smaller mechanical monsters in the lead press room.

This unit towers over 19 feet in height and weighs 65 tons, as compared to a weight of 46 tons and a height of 15 feet 8 inches of its nearest rival. Compared with this previously largest type of lead press the construction of the champion is noteworthy in that, although it is higher by three and a third feet and heavier by 19 tons, the square feet of floor space

(Continued on page 156)



Bearings and Grinding

~ world efficiency and high speed

THE world's precision machinery and fast-moving vehicles depend for their efficiency and speed on ball and roller bearings. Anti-friction bearings by the millions are being produced in great plants employing thousands.

One of the major production operations—one that has made ball and roller bearing accuracy possible is "grinding." Batteries of Grinding Machines are to be found in every ball and roller bearing plant.

Many of these plants are equipped with Norton Grinding Machines. Many of them use Norton Grinding Wheels and Alundum Polishing Abrasives.

Norton Research Engineers, Chemical Engineers, Mechanical Engineers and Sales Engineers are serving this as well as many other industries, meeting present production needs and studying into ways and means of bringing about greater accomplishment in the days to come.

NORTON COMPANY

WORCESTER, MASS.

NORTON

Grinding Wheels
Grinding Machines



Refractories-Floor
and Stair Tiles

Please mention The Armour Engineer

FRATERNITIES

(Continued from page 137)

brothers, Sigma Kappa Delta extends congratulations and best wishes for success.

This year has been a successful one for Sigma Kappa Delta, for we have had the very best of times in all of our activities, both school and fraternity. Now when the school year is over we will have our fling and will come back with greater ambitions for next year.

PHI PI PHI

With the coming of spring two matters, house cleaning, and athletics, have been foremost in the minds of Phi Pi Phi. Under the careful supervision of Abe Gent, the house has taken on a new and very delightful form. Rooms redecorated, floors varnished, new trimmings and some new furniture have combined to give the pleasing effect now prevailing.

In the way of spring athletics our activity has been equally great. Daily some of our boys can be seen on the diamond, cinder track, tennis courts or golf links, practicing their particular sport in the hope of maintaining our athletic reputation. Our basketball uniforms have been put away till next season, after what we consider very good usage. A brief summary of our basketball triumphs include the interfraternity championship, and that of our tri-chapter meet; in the A. A. F. Tournament we met defeat in the quarter finals at the hands of the Continental National Bank by a score of 25 to 20.

Our activities have not alone been in athletics. Evidence of this may be seen by

the number of our men wearing pledge ribbons or keys of honoraries, and also the activity on the school publications, especially the new Armour Tech News. The musical clubs also claim several of our men.

A social fraternity, however active in school events, would hardly be living up to its name without some parties or dances. In this line we had our annual spring dance, Saturday, April 14. This was voted one of our most successful affairs, with a hot orchestra, and the newly decorated house for a background aided in offering those present a very enjoyable time.

We also take pleasure in announcing at this time the newly elected brother, who, having passed through that memorable week of initiation, are now proudly wearing the badge of Phi Pi Phi. These men are Clarence Robin, Thomas Sullivan, and William Winkler.

The school year drawing to a close, Phi Pi Phi extends its congratulations to the graduates and wishes them great success in their future undertakings, and to the rest of the student body we hope you have an enjoyable summer, coming back next fall with renewed vigor and vitality.

BETA PSI

At the end of every school year we feel some regret and some joy; regret because we must part with some who have made college life happier and have incited us to do our best in all we have attempted; rejoicing on the part of those who have finally achieved the long-sought-for sheepskin.

Junior Week was, as usual, a busy one. Open House was held during the entire week, with emphasis on the night of the

Home Concert. A fitting finish was given to this week by an Alumni Smoker on the night of May 19.

The last event of the social season was a Farewell Dance which was presented on May 25.

RHO DELTA RHO

The Rho Delta Rho Fraternity is happy to announce the addition of five new members to the active section, after the initiation on March 30, 1928: H. J. Kaynor, M. M. Moskovitz, M. Boshes, I. M. Berger, L. Fidelman.

Our annual dance at the Belmont Hotel proved to be the biggest success of our social season. The music, the novel programs, and the high spirits of the crowd contributed toward making it an occasion which will be long remembered by all who attended.

At present, plans are being completed for participation in the activities of Circus Day, and from present indications it will be of unusual character.

The members of Rho Delta Rho Fraternity further take this opportunity to extend their heartiest congratulations to the founders of the Armour Tech News and pledge their earnest support to the success of the enterprise. We feel that a vacancy has been filled in the activities of the Armour students and know that this institution will be perpetuated by the incoming classes.

DELTA TAU DELTA

Chapter Gamma Beta announces the initiation of the following men: F. J. Aste, D.
(Continued on page 150)

TO THE CLASS OF '28

THE ARMOUR ENGINEER

Congratulates You and Wishes You Good Luck

To you alone we offer the special rates as listed:

1 Year	- - -	\$1.00
2 Years	- - -	1.75
3 Years	- - -	2.50

Payable before June 1st to

THE ARMOUR ENGINEER

*The
Timken Roller Bearing Company
wishes you success*

*APPLICATIONS ARE INVITED FROM
GRADUATE ELECTRICAL AND ME-
CHANICAL ENGINEERS AMBITIOUS TO
EMPLOY THEIR PROFESSIONAL TRAIN-
ING IN THE INDUSTRIAL SALES FIELD*

Please mention The Armour Engineer

C. Baldwin, E. T. Holin, W. Jervis, J. M. McAlcar, H. R. Nissen, and T. R. Sheuler.

The formal initiation ceremony was held on the afternoon of March 25. The following Sunday the chapter held open house and the parents of the actives were invited. A buffet luncheon was served in the late afternoon. This was the first real opportunity the newly initiated men had of showing their parents the house.

On the night of March 22 probation week routine was broken up by the annual bridge tournament. The alumni and the actives formed the two teams. Needless to say the alumni walked off with all honors by winning the three prizes.

Not being superstitious the chapter gave a house dance on Friday, April 13. Dets from Chicago, Northwestern, Georgia Tech, and Vanderbilt helped to make the dance the success it was.

The school year being nearly finished, the social calendar has only a few more parties listed. Their dates are as follows: April 27—O'Ether Dance; May 10—Monte Carlo Stag; May 25—House Dance; June 2—Farewell Party; June 6—Beach Party.

Bill McKimie did not return to school this semester but is now affiliated with the Curtis Aeroplane Co. His work required his presence in New York City and he expects to remain there for some time.

Bob Butterworth returned to his home in Everett, Washington, after helping initiate the freshmen.

Gamma Beta offers its congratulations to the graduating class of Armour Institute and extends its sincere wishes for the future success of the members of this class.

THE ARMOUR ALUMNUS

(Continued from page 139)

anxious to keep in touch with the various members of the class so as to be possessed with good addresses for the entire membership of that class when it comes time to make announcements of their class reunion in 1930. Urban can be reached at 204 Broad St., Charleston, West Virginia, and Allaire at 204 American Trust Bldg., Cedar Rapids, Iowa. Members of the class of 1927 are urged to advise either of the above of any changes of addresses.

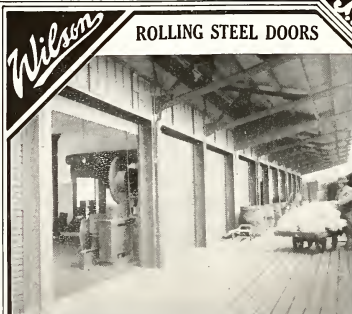
Mr. Fred Clarke of the class of '07, has been appointed general sales engineer of the Western Electric Company. He is stationed at the headquarters of the company at 195 Broadway, New York City. In 1905, before graduating from Armour, Mr. Clarke began his career in the Bell Telephone System. His various services have been with the Illinois Bell Telephone Company, the Michigan Bell, the American Telephone and Telegraph Company, and the Ohio Bell Telephone Company. From the latter he went to the Western Electric Company, the manufacturing unit of the Bell System, in 1923, as general installation engineer. He has recently taken charge of sales and price studies and associate matters, with the title of general sales engineer.

Recently we received a letter from J. K. Stahl, '25, who wrote to advise that he is eastern representative of the Strom Bearings Company of Chicago. He had been transferred from Springfield, Mass., to Philadelphia. His office address is Room 1211, Franklin Trust Building, Philadelphia, Pa.

Saw a letter from Robert Smyth Adams, '16, addressed to Dean Penn. He is with the U. S. Gypsum Co. at Genoa, Ohio. He is living at 2237 Maplewood Ave., Toledo, Ohio. He writes that he gave his name to the present Mrs. Adams about six months ago and has been kicking himself since that it had not been six years ago.

Edwin Schwarz, '25, who has been employed by the General Electric Company as a student engineer since August, 1925, has accepted a position with the Kansas City Power and Light Company, of Kansas City, Missouri.

We have a letter from George D. Arachovitis, '25, telling us that he has legally assumed a new spelling of his name. Henceforth his last name will be spelled Arvitis, which according to his own expression is simpler and retains its originality. He takes the State's structural engineering examination this month. We wish him good luck.



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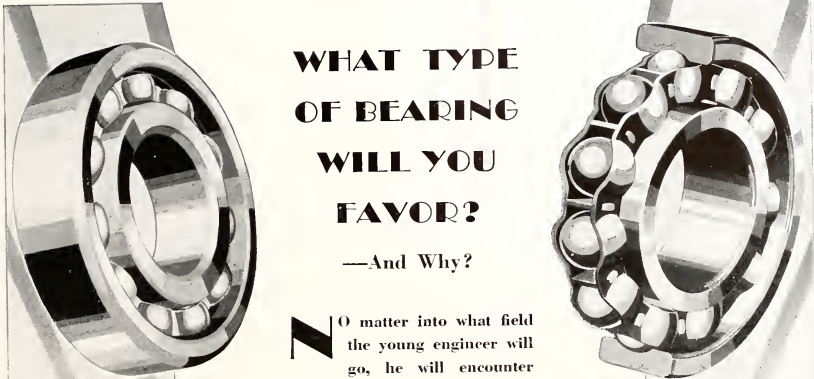
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The first discussion will deal with the subject of *precision* and its importance in the making of the highest type of anti-friction bearing.

THE NEW DEPARTURE MFG. COMPANY
BRISTOL, CONNECTICUT
Chicago San Francisco Detroit

A Division of General Motors Corporation

New Departure Quality Ball Bearings

Charles A. Misura, '23, drove up to Chicago from Hot Springs for the tail end of a two weeks' vacation he was enjoying. He dropped into the Institute to say hello. He has been working for G. L. Tarlton, General Contractors, in St. Louis for the past two years, during most of that time working on contracts for installation of street laying equipment for the city. He can be reached at 1406 Ambassador Building, St. Louis, Mo.

M. T. Goetz, '27, an E. E. at Armour but an F. P. E. now, is an engineer with the Illinois Inspection Co.

Had occasion recently to scan the pages of an issue of *The Chemist Analyst*. It was a pleasure to find therein an article by a former classmate. The piece was entitled, *Rancidity in Fats and Oils, Its Determination and Significance*, and was composed by Louis A. Spielman, '22, who is chemist for the Glidden Food Products Company, 2670 Elston Avenue, Chicago, Illinois. Wish to take this means of commending Spielman on his work since he graduated. The article and the various reports that have been received are very favorable.

In a letter sent to his fraternity house, George Kinsman, '24, told about a few of his fraternity brothers who are like himself in Florida. He writes that "Bob" Maguire, '22, is with the Florida Inspection Bureau and travels around those parts out of headquarters at Jacksonville. He was recently

in Cuba and stopped off in Coral Gables to visit with George and "Russ" Grove, '23. Grove is General Claim Agent for the Florida Power & Light Company, while his pal George is in the rate department of the same Company.

ARMOUR ARCHITECTURAL SOCIETY

The award of two first medals in Beaux Art work to Ted Samuelson and Irving Bowman on their last two problems is one of the most noteworthy events that has taken place in the architectural department. These fellows certainly deserve all the credit and honor that goes with a medal solution of a class "A" problem, as it represents not only the many hours expended on this problem, but also the well directed application of the methods learned in the solution of the previous problems. Mr. Samuelson's solution was the design of a Protestant church, while that of Mr. Bowman's was the design of an ultra-modern skyscraper office building with all the trimmings, which included three-level streets. The renderings were exceptionally fine. Mr. Bowman's design received, in addition, fourth alternative place in an important prize problem. Much credit is due him, as competition is exceptionally keen on these prize problems.

FIRE PROTECTION ENGINEERING SOCIETY

It is now fitting to look back and see what progress was made during the past year, what things were learned and what mistakes

needed to be remedied. The Fire Protection Engineering Society has had a very promising year, during the course of which many speakers of prominence spoke to the Society on subjects of insurance and fire protection. These talks were educational and tended to broaden the undergraduate's viewpoint on the problems with which he must come in contact when he leaves school. The Society did not neglect its social life, for a very enjoyable smoker was given at the Theta Xi fraternity house during the end of the first semester.

New methods were introduced during the year and have proved successful—the speakers for the Society are now interviewed by a committee appointed by the president. In the past this laborious task was borne by the faculty.

The Society thanks the faculty, the officers, and all those who participated in making the year a very successful one.

WESTERN SOCIETY OF ENGINEERS

At a recent meeting of the Armour branch of the W. S. E., the speaker of the occasion was our own Prof. Henry Penn, who gave a discussion on the details of construction of an eight-track bridge. His talk was very meritorious and was appreciated by those who attended.

The graduating seniors wish the remaining members their heartiest best wishes for the success of the Armour branch during the following year.

WIRE

wire, flat wire, star-shaped and all different kinds of shapes of wire, sheet wire, piano wire, pipe organ wire, wire hoops, barbed wire, woven wire fences, wire gates, wire fence posts, trolley wire and rail bonds, poultry netting, wire springs, concrete reinforcing wire mesh, nails, staples, tacks, spikes, bale ties, steel wire strips, wire-rope aerial tramways. Illustrated story of how steel and wire is made, also illustrated books describing uses of all the above wires sent free.

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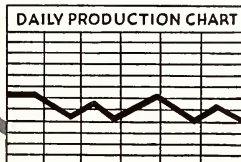
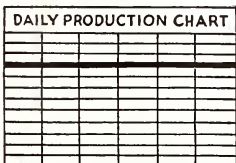
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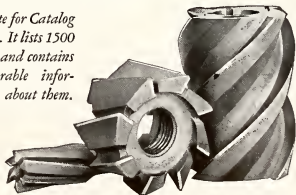
CUTTERS ALONE CAN MAKE THIS DIFFERENCE

THE first chart illustrates a healthy production. The second shows a production that is suffering with "sinking spells."

Milling Cutters alone can make this much difference on the same machine. When inferior, poorly designed cutters are used, they become dull quickly, power is wasted in nursing them along, and production suffers.

As the result of years of experience, the Brown & Sharpe Cutter Department has developed cutters that stay sharp for long periods between sharpenings, save power, and give a steady high production such as that shown in the first chart.

Write for Catalog
 No. 30. It lists 1500
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 considerable infor-
 mation about them.



BROWN & SHARPE

BROWN & SHARPE MFG. CO. PROVIDENCE, R. I., U. S. A.

THE NEW AMERICAN TEMPO

The new American tempo is manifesting itself in a number of interesting ways: In the public's disconcerting willingness to turn its back on established institutions, products, methods, and ideas, as evidenced by the rusting rails of hundreds of abandoned trolley lines; by the difficulty a woman with long hair was experienced for the past two years in finding a job, or a hat large enough to fit her head. Witness the public's promptness, amounting almost to aggressiveness, in accepting new products, new methods, new institutions and ideas, the radio, balloon tires, the tabloid pictorial newspapers, the movie, Duco finish, electric refrigeration, pale ginger ale, four-wheel brakes, stepped-back skyscrapers, co-operative apartments, symphony concerts by radio, installment buying and Air Mail. These new developments lose their novelty so fast, and are accepted with such utter matter-of-factness, as to take away the breath of the older generation of business men.

Stable and experienced business men are today secretly or openly worried for fear something will happen suddenly—another invention like radio, another craze like bobbed hair, another development like the auto bus, another national upheaval like prohibition—that will wipe out or seriously cripple their business, make costly machinery useless, or destroy the monopoly of some pet patent, without giving them time to turn around.

On the other hand, a new crop of business geniuses has sprung up—men who, with nothing much to lose and everything to gain, have caught the new tempo and jumped in at the right time to capitalize the movie, the swing to Florida, the radio, the short skirt, the six-cylinder complex, the lure in literature.

There is no telling in what direction invention will lead next. But there is now no excuse for the man who ignores an invention which threatens his business. If he makes refrigerators, he may at least make them so that they will readily accommodate an electric or gas refrigerating unit. If he is in the steel or the aluminum business, he may at least start his research department working on new alloys, or he may anticipate that such a metal may be developed and lay plans to protect his business in case it is.

"Step on it" is more than motor slang: It is expressive of a new American attitude: have what you want, do what you want to do, be where you want to be—and without waiting.

Adapted from *Advertising and Selling*.

MODERN BUSINESS ETHICS

Within a few years an extraordinary change in the manners and customs of business has taken place as an idea of SERVICE has come to govern business relations. The thought of "live and let live" is coming to be an internal law of business dealing. Competition is perhaps keener than ever, but the old ferocity has gone out of it. Competition, now, is in achievement, not in killing.

Of course, even yet nobody claims that business is a finished civility. Neither is civilization finished. This is almost as easy to prove as that professional practices do not always agree with the code to which the practitioner has solemnly subscribed. That means very little, except that it is another way of saying that human nature is what we already know it to be. But the important thing is that business has come to

a sense of need for codes, even codes higher than the average of practice. The ideal is more important than the default.

Under the head of business ethics one might collect a most extraordinary set of documents in the form of codes. There is hardly any group in big or little business that has not written for itself a code of ethics—undertakers, coffin makers, photographers, restaurant keepers, jewelers, fishermen, druggists, advertising men, credit men, optometrists, lumber dealers, grocers, ice men, plumbers. Generally the code is a restatement of the Golden Rule, to which is added specific prohibition of internal practices peculiar to the trade, together with a declaration holding the group morally accountable to the public for fair dealing. There are seldom any penalties. What is stated therefore is a standard, not a law. Delinquencies, of course, are very frequent. None of them seems material.

What does all this code making represent? First a desire on the part of every business group to raise its self-esteem; secondly, a desire to possess the good opinion of the public. Neither one desire nor the other is likely to decline; both will rise. The moral basis is firm.

From Garret Garrett in *The Saturday Evening Post*.

Stude—Sir, I'd like to petition to be away three days after vacation.

Dean—Ah, you wish to have three more days of grace.

Stude—No, sir—three more days of Gertrude. —Sircn.

"Will the wedding be an elaborate affair?" "Certainly, they even have two engineers to manage the bride's train."

—Virginia Reel.

CHARLES W. HILLS

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CHARLES W. HILLS

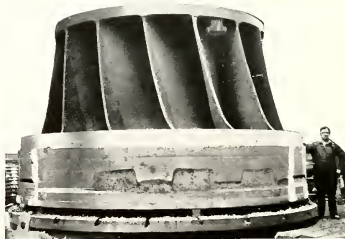
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The Conowingo Development forms one link in the chain of the Super Power System of the Philadelphia Electric Company. ALLIS-CHALMERS has supplied four turbines rated at 54,000-h.p. each, operating at 81.8-r.p.m. and 89-ft. head. These are the largest turbines, in physical size, ever built.

ALLIS-CHALMERS has built or has on order—

30 units exceeding 30,000-h.p., totaling 1,381,500-h.p.

36 units 20,000-h.p. to 30,000-h.p., totaling 787,700-h.p.

61 units 10,000-h.p. to 20,000-h.p., totaling 929,550-h.p.

This means a grand total of 130 units averaging over 23,000-h.p. each.

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In St. Louis, the majestic Southwestern Bell Telephone Building (Mauran, Russell & Crowell, Architects), is also equipped with Mississippi Polished Wire Glass. Every window above the ground floor has Mississippi protection. Added recognition for the recognized standard in Wire Glass.

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ANTI-KNOCK TESTS

(Continued from page 133)

same benzol equivalent for the four knock intensities owed, or in other words the locating line is vertical. It is also to be noted that the reference chart is constructed with benzol and the compared fuels are usually petroleum products. Here again we have emphasized the need for two petroleum fuels that may be mixed in varying proportions to give resultant fuels of various anti-knock standards.

TELEPHONE CABLE MANUFACTURE

(Continued from page 146)

covered by each type is practically the same. This feature is an important one, for floor space is a very valuable commodity.

In a single day's run the new press can apply the metal sheath to about a mile and a half of the largest sized cable made at the Hawthorne Works. This is about 2,680 linear feet of cable per day better than any other press ever turned out, while a comparison with original cable covering methods is really astounding.

With the cable plant installation of three new seven and one-half ton bridge cranes for transporting loaded reels, the cable plant at the Western Electric Company now handles cable much as the best bakeries do bread, the Hawthorne cable like their bread "is not touched by human hands."

That means that the 21,007,074,000 conductor feet of lead covered cable manufactured at Hawthorne in 1927 was carried, revolved, lifted, placed, and pushed entirely by machinery. Each reel of cable is handled six times by bridge cranes alone, not counting the other mechanical handling. If it were not for the now complete crane transportation system the cable plant would be unable to move its output

fast enough to keep up with its production of 20 reels per hour, thus necessitating a night shift. As it is, the plant works on a day shift only, with one reel of cable leaving Hawthorne by freight every three minutes.

The five bridge cranes engaged in cable transportation are by no means pygmies, measured either in size or performance. Known to mechanical engineers as three-motored cranes, they are in reality each equipped with five motors, three of which are used for major operations, and two for actuating the reel grappling mechanism. It is interesting to note that these cranes despite their gigantic proportions and the tremendous amount of very heavy work they do, expend an unusually small amount of energy.

Figures furnished by the Hawthorne engineering department reveal that if all five of these cranes were functioning simultaneously with their motors loaded, they would use at any one moment only 117 units of horsepower, and yet in one year at the present rate of operation these economic mechanisms total a lift of over 673,000 tons, which is just 12 times the weight of the Leviathan, the world's largest steamship.

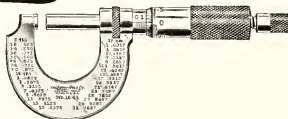
To further convey an idea of the magnitude of the work done by these Gargantuas, the plant output figures show that during 1927 the two cranes in the reel yard handled 54,807 reels, totaling 224,339,177 pounds, which figures do not include the additional handling of reels occasioned by shifting their positions in the yards and placing them in temporary storage.

Because almost the entire job of moving the cable plant's output is up to the cranes, these steel Samsons are equipped with extra wigs in case their own hair should be shorn; that is, they carry spare grappling arms, which may be affixed in an hour should one of the regular grapplers give out. This was not prepared simply as an emergency measure to avert a tie-up in



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A Star Ham to Us, is Something You Are Going to Eat

MEAT is the most important item in the daily diet. Millions of homes look to thousands of retail meat dealers every day to supply this necessary food. These in turn look to Armour and Company as their source of supply—which never fails.

Back of this picture is another—a score of huge packing plants strategically placed to best serve consumers of meat and producers of livestock—

500 branch houses bringing daily supplies close to daily markets—

1500 refrigerated cars leaving these eighteen plants for these 500

branch houses every day—60,000 employees upholding the

Armour standard—"Armour on a food product is an assurance

of quality"—Thousands of farmers and ranchers producing

annually fifteen million head of livestock which Armour

and Company turn into food—and for which they pay

the raisers hundreds of millions of dollars on delivery.

And back of this, another picture—the Armour

Kitchen in Chicago—the point of contact between

you and your home, the ranchers and farmers,

the buyers, dressers and processors of meat.

Here under the direction of domestic science

experts is determined for Armour what

you and your folks demand. From here

is enforced every step in preparation

that must be observed so that

every Star Ham is a delight

when it reaches your table.

For sixty years Armour and Com-

pany have been perfecting meth-

ods to safeguard the meat

supply of the nation. Star

Ham is but one of the

quality products that

has established

Armour and Com-

pany's reputa-

tion among

the world's

leading

provis-

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